

ATTACHMENT II-WAP

WASTE ANALYSIS PLAN

TABLE OF CONTENTS

| | |
|---|-------------------------------------|
| TABLE OF CONTENTS..... | I |
| 1 INTRODUCTION: | 1 |
| 1.1 OBJECTIVES:..... | 1 |
| 1.2 PURPOSE: | 1 |
| 1.3 IDENTIFICATION OF WASTES: | 7 |
| 1.3.1 Wastes Acceptable for Storage and Treatment: | Error! Bookmark not defined. |
| 1.3.2 Waste Prohibited from Management at GMF: | 7 |
| 2 WASTE CHARACTERIZATION, ANALYTICAL PARAMETERS AND RATIONALE: | 8 |
| 2.1 ROUTINE WASTES | 8 |
| 2.1.1 Profile Approval/Pre-Acceptance Process | 8 |
| GENERAL INFORMATION | 11 |
| CHEMICAL COMPOSITION..... | 11 |
| PHYSICAL DESCRIPTION..... | 11 |
| REGULATORY INFORMATION..... | 11 |
| GENERATOR CERTIFICATION..... | 11 |
| ADDITIONAL INFORMATION MAY BE REQUESTED ON THE PROFILE..... | 12 |
| 2.1.2 Load Acceptance and Handling of Discrepancies: | 13 |
| 2.2 LAB PACKS: | 15 |
| 2.2.1 Profile Approval Process: | 16 |
| 2.2.2 Load Acceptance and Handling of Discrepancies: | 17 |
| 2.3 DEBRIS AS DEFINED IN 40 CFR 268.2:..... | 18 |
| 2.3.1 Profile Approval Process: | 18 |
| 2.3.2 Load Acceptance and Handling of Discrepancies: | 19 |
| 2.4 MSDS WASTES: | 19 |
| 2.4.1 Profile Approval Process: | 19 |
| 2.4.2 Load Acceptance and Handling of Discrepancies: | 20 |
| 2.5 TRANSFER OPERATIONS: | 20 |

| | | |
|----------|---|-----------|
| 2.5.1 | Profile Approval Process: | 20 |
| 2.5.2 | Load Acceptance and Handling of Discrepancies: | 20 |
| 2.6 | NON-HAZARDOUS / NON-RCRA / NON-TSCA REGULATED WASTES:..... | 21 |
| 2.6.1 | Profile Approval Process: | 21 |
| 2.6.2 | Load Acceptance and Handling of Discrepancies: | 21 |
| 2.7 | STORAGE ONLY WASTES: | 22 |
| 2.7.1 | Profile Approval Process: | 22 |
| 2.7.2 | Load Acceptance and Handling of Discrepancies: | 22 |
| 2.8 | STORAGE WASTES FOR COMMINGLING | 23 |
| 3 | TEST METHODS:..... | 30 |
| | TABLE C-4 | 40 |
| | ANALYTICAL PARAMETERS AND ASSOCIATED METHODS | 40 |
| | NOTES:..... | 40 |
| | FACILITY METHODS | 41 |
| | (CONTINUED) | 41 |
| 3.1 | IGNITABILITY SCREEN FOR SLUDGES (GMF-8B)..... | 41 |
| 3.2 | IGNITABILITY SCREEN FOR LIQUIDS, SOLIDS AND SLUDGES (GMF-9401)..... | 41 |
| 3.3 | WASTE COMPATIBILITY QUALITATIVE ASSESSMENT (GMF-12)..... | 42 |
| 3.4 | LEL (GMF-14) | 42 |
| 3.5 | COMBUSTIBLE VAPOR TEST (TLV SNIFF) (GMF-5)..... | 42 |
| 3.6 | TLV SNIFF / FIELD (GMF-5-MOD)..... | 43 |
| 4 | WASTE SAMPLING: | 57 |
| 4.1 | SAMPLING LOCATIONS: | 57 |
| 4.2 | SAMPLING METHODS: | 57 |
| 4.3 | TRACEABILITY: | 58 |
| 4.4 | SAMPLING PERSONNEL: | 58 |
| 4.5 | SAMPLE LABELS: | 58 |
| 4.6 | RECORD (LOG BOOK, UNLOAD WORK ORDER, OR EQUIVALENT): | 58 |
| 4.7 | SAMPLE PRESERVATION: | 59 |
| 4.8 | SAMPLING SMALL CONTAINERS: | 59 |
| 4.9 | SAMPLING LIQUID TANKS: | 60 |
| 4.10 | SAMPLING BULK MATERIALS:..... | 60 |

| | | |
|----------|--|-----------|
| 4.11 | FROZEN WASTE: | 61 |
| 4.12 | OTHER SAMPLES (I.E., PROCESS EQUIPMENT, CONTAINMENT, SUMPS, ETC.): | 61 |
| 4.12.1 | Post Treatment Sampling of Waste Treated in Stabilization Tanks..... | 62 |
| 4.12.2 | Surface Impoundment | 62 |
| 5 | PRE-TREATMENT PROCEDURES: | 64 |
| 5.1 | VISUAL INSPECTION: | 64 |
| 5.2 | WASTES THAT DO NOT REQUIRE SAMPLES | 65 |
| 6 | TREATMENT PROCESSES..... | 65 |
| 6.1 | SOLIDIFICATION..... | 65 |
| 6.2 | STABILIZATION / OXIDATION / REDUCTION, ETC..... | 66 |
| 6.2.1 | Process Descriptions..... | 66 |
| 6.2.2 | Frequency and Scope of Testing..... | 66 |
| 6.3 | HAZARDOUS DEBRIS..... | 72 |
| 6.4 | CARBON ADSORPTION | 73 |
| 7 | RECORD KEEPING FOR WASTE CODES | 73 |
| 7.1 | WASTE CODE RECORD KEEPING FOR STORAGE AND/OR TREATMENT VESSELS: ... | 73 |
| 7.1.1 | Wheel Wash Collection Tank | 74 |
| 7.1.2 | Site Water Storage Tanks | 74 |
| 7.1.3 | Stabilization Tanks | 74 |
| 7.1.4 | Storage/Treatment Vessel Waste Code Tracking Procedure | 74 |
| 8 | ANALYSIS OF TREATED WASTE: | 75 |
| 9 | FATE OF TREATED WASTES: | 75 |

WASTE ANALYSIS PLAN

1 INTRODUCTION:

1.1 Objectives:

This Waste Analysis Plan applies to waste streams that meet the definition of hazardous waste found in R315-2-3 and mixtures of hazardous waste and PCB waste streams. Waste streams that are PCB-only waste streams are subject to the requirements of the PCB Waste Analysis Plan (Attachment II-PCB-WAP).

The objective of the waste analysis plan (WAP) is to describe the procedures that will be undertaken to obtain sufficient information about waste streams to operate the facility in accordance with the permits. More specifically, the waste analysis plan ensures that wastes accepted are appropriate for management at the facility and that the wastes that arrive at the facility are the same as those evaluated in the profiling process.

This plan also anticipates that wastes will be generated on-site and will ultimately be accepted for storage and/or treatment at this facility. These wastes will be subject to the same waste analysis procedures as wastes accepted from off-site sources except for incoming load procedures which are not required for site generated wastes.

In accordance with R315-8-2.4, 40 CFR §264.13(b) and, (c); 268.7 and 270.14(b) (3), this waste analysis plan addresses the RCRA regulated wastes that will be transferred, stored, treated, disposed, or any combination of these actions at the facility.

1.2 Purpose:

The purpose of this waste analysis plan (WAP) is to establish necessary sampling methodologies, analytical techniques, and overall procedures for characterization, acceptance, storage, treatment and/or disposal of hazardous wastes accepted or generated at the facility.

This waste analysis plan establishes the following:

- The parameters for which each hazardous waste will be analyzed and the rationale for selection of each parameter.

- The test methods which will be used to test for these parameters.
- The sampling methods which will be used to obtain a sample of the waste to be analyzed.
- The frequency with which the initial analysis of the waste will be reviewed or repeated to ensure that the analysis is accurate and up-to-date.
- The frequency with which the analysis of the waste will be performed to assure that the wastes or treated wastes are in compliance with the applicable treatment standards set forth in 40 CFR §268.40 through §268.49.

The WAP is intended to be the primary reference document for all waste analysis performed in conjunction with operation (and closure) of the facility except for groundwater which is covered by Module VII and its associated attachments. The WAP addresses the following topics:

- o waste characterization, analytical parameters and rationale (Section 2)
- o pre-acceptance procedures (Section 2.)
- o incoming load procedures (Section 2.)
- o test methods (Section 3.)
- o waste sampling (Section 4.)
- o pre-treatment procedures (Section 5.)
- o treatment processes (Section 6 .)
- o record keeping for waste codes (Section 7.)
- o analysis of treated wastes (Section 8.)
- o fate of treated wastes (Section 9.)
- o quality assurance and quality control (Appendix 1).

A Quality Assurance Plan (QAP) for required waste analysis is included as Appendix 1 of this waste analysis plan. The QAP describes the methods and procedures that laboratory personnel use to assure integrity of laboratory data. The QAP contains the specific procedures and practices used within the laboratory in order to ensure that the resulting data are technically sound, statistically valid, and properly documented.

This waste analysis plan is supported by Standard Operating Procedures (SOPs) including specific procedures and/or test methods. The SOPs, or test method instructions, are used by laboratory personnel as detailed instructions for performing the necessary procedures. The SOPs are incorporated by reference as part of this waste analysis plan. They are required for Utah Certification of the laboratory and will be followed for compliance with the

permit.

Definitions:

The following terms, applied within the WAP, will have the following meaning:

- Accept, Accepted or Acceptance: When it has been determined that a waste shipment received at the facility conforms to the approved profile (or all discrepancies have been resolved).
- Accuracy: The closeness of a result, or the arithmetic mean of a set of results, to the true, expected, or accepted value.
- Analysis: The term "analysis" means any method by which the value of a particular parameter is determined. These methods may include laboratory procedures specified in this Waste Analysis Plan or may rely on knowledge of the waste or the process generating the waste.
- Analyte: The substance, element or compound for which a sample is analyzed to determine its presence or quantity. Also known as an analytical parameter.
- Analytical Method: A quantitative procedure for determining the specific concentration or characteristic of an analyte or analyte group.
- Approve, Approved, or Approval: This term is used in the context of evaluating a profile. Approval of a waste stream profile occurs after all necessary evaluations and analyses have been made and when the generator is notified.
- Aragonite: Clean Harbors Aragonite, LLC.
- Audit, performance: A check on the performance of analysts. Sometimes categorized as a quantitative appraisal of quality.
- Audit, system: An on-site inspection or assessment of the laboratory's control system and procedures.
- Bulk Load: The term "Bulk Load" will mean any individual waste shipment transported to the facility which is too large to be managed through the Container Management Building (e.g. an intermodal container, end-dump truck, tanker truck, railcar, etc.).

- Clean Harbors: Parent corporation of the Grassy Mountain facility.
- Clive: Northeast Casualty Real Property, LLC.
- Executive Secretary: Means the Executive Secretary of the of the Utah Solid & Hazardous Waste Control Board.
- Generator: Generator or generators authorized representative.
- Generator Knowledge: If generator knowledge is used to make a hazardous waste determination, information must be available to substantiate the waste evaluation. Below are examples of information that can be used to make the waste evaluation required under R315-5-1.11 (40CFR262.11 by reference). Some or all, or other information can be used to make a hazardous waste determination applying generator knowledge.
 1. Facility specific process flow diagram or narrative description of the process generating the waste (should be used in most cases);
 2. Chemical makeup of all ingredients or materials used in the process that generates the waste (should be used in most cases);
 3. List of constituents that you know or have reason to believe are byproducts or side reactions to the process that produces the waste;
 4. Material Safety Data sheets (MSDSs) and/or product labels or substances used in the process that generates the waste;
 5. Data obtained from approved methods of sampling and laboratory analysis of waste generated from the same process using the same ingredients/materials;
 6. Data obtained from literature regarding waste produced from a similar process using the same ingredients and/or materials; and/or
 7. Documentation of product specifications of input materials and output products
- GMF: Clean Harbors Grassy Mountain Facility. When referring to facility specific test methods, "GMF-" and "SK-" as a prefix to the method number can be used interchangeably.
- Hazardous waste: The definition of "hazardous waste" shall be as provided in 40 CFR 261.3.

- Holding Time - The maximum time allowable between time of sampling and time of extraction and analysis, or both.
- Incoming Load: The term "Incoming Load" refers to a load during the period beginning when a waste shipment arrives at the facility through when a waste shipment is rejected or accepted. Incoming loads may be placed in a storage unit pending the acceptance procedure.
- Laboratory Manager: The "Laboratory Manager" or however named by certifying agencies, refers to the individual or designee responsible for implementation of the WAP.
- NELAP: Means the National Environmental Laboratory Accreditation Program
- Non-hazardous waste: "Non-hazardous waste" refers to "solid waste" as defined in 40 CFR 261.2 which is not "hazardous waste" as defined in 40 CFR 261.3.
- Parameter: The term "parameter" is a specific material property, such as pH, specific gravity, viscosity, etc.
- Particle size: The largest dimension of a portion of a waste.
- PCB(s): The term "PCB(s)" refers to PCB(s) or PCB Item(s) as defined in 40 CFR 761.
- PCB Waste: Means any mixture of liquid, solid, or sludge that contains PCBs regulated under 40 CFR Part 761.
- Post-treatment: The period following treatment of a waste is referred to as "Post-treatment"
- Pre-acceptance: The period in which a waste stream's acceptability for storage and treatment at the facility is evaluated, is referred to as "pre-acceptance." This is the same as the Profile Approval Period.
- Precision: The agreement or repeatability of a set of replicate results among themselves or agreement among repeated observations made under the same conditions.
- Pre-treatment: The term "Pre-treatment" refers to the period between

acceptance and treatment of the waste.

- Profile: Means the electronic or other document that describes a waste or waste stream.
- Radioactive: A "Radioactive" material shall be any Byproduct or Source Material licensable by the Utah Division of Radiation Control or the NRC, or any waste found to have a count rate as measured one inch from the surface that exceeds background by 40 microR/hr or more.
- Receive or Received: Means when waste passes into the fenced portion of the facility.
- Representative sample: Means a sample exhibiting average properties of the whole waste.
- Suitable Laboratory: A "suitable laboratory" is an analytical laboratory which, after review of its Quality Assurance Plan (QAP), meets the minimum quality assurance requirements as specified in the GMF QAP. Any non-Clean Harbors laboratory must also provide the QA/QC documentation for the analytical results it provides which must include analytical methods used. A Suitable Laboratory is one of the following:
 - A laboratory certified by the State of Utah Bureau of Laboratory Improvement;
 - A NELAP approved lab; or
 - A lab approved by the Executive Secretary in writing.
- Screening Method: A semi-quantitative procedure for determination of the specific concentration, or characteristic of an analyte or analyte group.
- Waste Stream: Waste stream means a waste that is, or can be, identified as a line item on the Uniform Hazardous Waste Manifest from the same source of generation and delivered with the same load. Identical materials with the same waste profile number, that are listed on separate manifest line items only because of container size or type are considered to be the same waste stream.
- Waste Treatment Stream: Means wastes that exhibit similar characteristics such that if shipped together, they could be placed on the same line item on the Uniform Hazardous Waste Manifest.

1.3 Identification of Wastes:

1.3.1 Wastes Acceptable for Treatment, Storage and/or Disposal:

Materials acceptable for storage, treatment and/or disposal at GMF include: solid waste including household hazardous waste, non-RCRA regulated wastes, etc., hazardous waste regulated under the Resource Conservation and Recovery Act (RCRA), the Hazardous and Solid Waste Amendments (HSWA), and Superfund (CERCLA), PCBs and other wastes as authorized by the Toxic Substances Control Act (TSCA), ~~and~~ RCRA/TSCA combined wastes and Corrective Action Management Unit-eligible (CAMU-eligible) waste as provided for in 40CFR264.555. CAMU-eligible wastes may be accepted for disposal, without treatment at the GMF, provided that the conditions of R315-8-21 (40CFR264.555 by reference) have been met, (which includes approval by the Executive Secretary).

Wastes are accepted in a variety of physical forms, including liquids, sludges, and solids. These wastes may not arrive in a 100% homogenous form. Appendix II of this Attachment lists the waste codes which may be accepted by the Permittee for management. The waste codes listed in the GMF HSWA permit may also be managed at GMF.

GMF may also temporarily (ten days or less) hold wastes manifested to another facility similar to that allowed in R315-6-1.12. The first of the ten days will be counted as the first calendar day after the waste has been received at the GMF and end at midnight on the tenth day. This will be referred to as transfer operations. There are no restrictions on waste codes for transfer operations.

1.3.1 Waste Prohibited from Management at GMF:

Materials that will not be accepted for management at GMF (except as specified in condition 1.4.1) include those that exhibit the following characteristics:

- DOT Forbidden, Class 1, Division 1.1, 1.2, 1.3 and 1.4 Explosives;
- Materials which test positive using the water reactivity screen unless the positive indication is solely the result of acid/base reaction or heat of solution, or it is in a lab pack. If it is for treatment at GMF, it must have prior approval of the Executive Secretary;
- Pyrophoric wastes and materials (Except in Lab Pack Quantities for storage only);
- Shock sensitive materials.
- Radioactive waste unless authorized for acceptance by the NRC or Utah

Division of Radiation Control, whichever has jurisdiction over the waste.

Materials not accepted for storage or treatment **in tanks** at GMF:

- those hazardous wastes which at the point of generation have an average volatile organic (hereafter referred to as VOC) concentration of > 500 ppmw.

Materials not accepted for storage **in tanks** at GMF:

- those wastes which are incompatible with the materials of construction of the tank.

Start here

2 WASTE CHARACTERIZATION, ANALYTICAL PARAMETERS AND RATIONALE:

The following sections describe the procedures that are followed for approving a waste stream for management at the facility. This includes the pre-acceptance procedures, incoming load procedures, and procedures for resolving discrepancies that may occur upon receipt of the waste. Because of differences in packaging, sampling requirements, lab analyses, and management options for the many waste types that will be handled at the facility, different procedures are necessary as noted in subsequent paragraphs of Section 2.

2.1 Routine Wastes

2.1.1 Profile Approval/Pre-Acceptance Process

When a generator has a new waste stream that is being considered for management at the facility, the Waste Profile Sheet information listed in section 2.1.1.5. shall be submitted. Once all the information is compiled it will be reviewed in order to assess the acceptability of the waste stream for management. These profile approval procedures occur prior to giving authorization to ship (40 CFR 264.12(b) / Module II.C.1) the waste to GMF. If additional information is required, to manage and treat the waste, an advance sample of the waste may be obtained from the generator at the discretion of GMF.

2.1.1.1 Waste Profiling – Arrival at GMF Without Prior Authorization

If a waste shipment arrives at the facility without prior authorization (prior authorization identified in Section 2.1.1), GMF is allowed to receive the waste. However, the generator must then be contacted and the steps outlined in Section 2.1.1 to establish the Waste

Profile information followed to ascertain whether GMF could accept the waste for management. If such wastes arrive at the facility, the waste will either remain in the custody of the transporter or placed into permitted storage locations according to DOT descriptions while pre-acceptance procedures are completed, the profile for the waste approved and the waste officially accepted.

If in communications with the generator the Waste Profile information cannot be established, because the generator doesn't have analytical results for the waste or is not able to characterize the waste by process knowledge, one of the following will then occur:

- A. Reject the load back to the generator
- B. Necessary and appropriate analysis of the waste will be obtained and the results evaluated. Based on the results one of the following actions will be taken:
 - 1. Reject the waste back to the generator;
 - 2. Reject the waste and send it to an appropriate TSDF;
 - 3. Accept the load for management at GMF and record the waste profile information.

2.1.1.2 Representative Samples

GMF is required to analyze a representative sample of new waste streams to verify the waste profile information supplied by the generator or add additional information to the waste profile. In most cases, the sample will be taken from the first shipment that is received at the facility. Once GMF has taken or received the representative sample, Table C-1 parameters and Table C-2 parameters (if appropriate) will be compared to the waste profile information to verify that the generator described the waste properties properly and to verify that the waste can be managed by GMF. Wastes may be placed into permitted storage locations according to profile descriptions while first load verification procedures are completed and the waste officially accepted.

2.1.1.3 Wastes for Treatment and/or Landfill

For RCRA regulated waste streams which will be treated and/or disposed in the landfill,

- 2.1.1.3.1 the completed Waste Profile Sheet is required and
- 2.1.1.3.2 the appropriate physical and chemical analyses from Table C-1 and Table C-2 are required.
- 2.1.1.3.3 Verification of LDR analytical information provided on the profile will be verified per 2.1.1.7.
- 2.1.1.3.4 For hazardous waste to be treated in stabilization tanks or placed in the Surface Impoundment: a Certification from the Generator that the waste at the point of generation does not have greater than or equal to 500 ppmw VOCs is required. The Waste Profile Sheet may be used by the generator to make this certification.
- 2.1.1.3.5 For incinerator residue wastes from Aragonite that are to be treated and/or disposed, analysis of the waste performed under the Aragonite WAP can be used in lieu of conducting the analyses identified in Tables C-1 or C-2. A physical description shall be provided so that a visual inspection of the load can be made upon arrival.

2.1.1.4 RCRA/TSCA Wastes for Treatment and/or Landfill

For RCRA/TSCA regulated waste streams which will be treated and/or disposed in the landfill,

- 2.1.1.4.1 the completed profile is required and
- 2.1.1.4.2 the appropriate physical and chemical analyses from Table C-1 and Table C-2 are required.
- 2.1.1.4.3 Listed wastes with constituents of concern having numeric LDR standards shall be tested for those constituents of concern (including PCBs) that the generator certifies meeting the treatment standards. Alternatively, the waste generator can supply analytical test results that shall serve to meet the verification requirement.
- 2.1.1.4.4 For waste being treated in stabilization tanks, a certification from the Generator that the waste as generated does not have > 500 ppmw VOC and the basis for the certification is required.

2.1.1.5 Profile Information

The profiles shall contain information about the generator, physical and chemical characteristics of the waste, process generating the waste, applicable waste codes, applicable DOT codes, and generator certification that the information he/she is providing is accurate. The following list details the minimum information that shall be supplied as part of the profile:

Generator Information

- Name
- Address
- Contact Person
- Phone #
- Facility EPA ID#

General Information

- Generating Process
- Common Name of Waste
- DOT Shipping Name
- DOT Hazard Class

Chemical Composition

- List of Chemical Constituents and Concentrations

Physical Description

- Physical Description
- Physical State
- Phases/Layering

Regulatory Information

- Regulated or Licensed Radioactive Waste
- Regulated Infectious Waste
- TSCA Regulated PCB Waste
- EPA Waste Codes
- State (Utah) Waste Codes

Generator Certification

- Certification signed by the generator that the information supplied on the

profile and any attachments or supplements represent a complete and accurate description of the waste..

Additional information may be requested on the profile.

Following the review of the profile and the physical and chemical analyses of the waste material, the waste stream shall be evaluated for management at the facility. This evaluation includes reviews of:

- Appropriate documents to ensure that acceptance of the waste material will be in compliance with all applicable federal, state, and local laws and regulations.
- The capabilities of existing treatment and storage facilities to ensure that GMF has the process capability and the ability to safely manage the waste material or that it can be safely stored and managed by an off-site facility.
- The physical and chemical characteristics of the waste material to ensure that the material is compatible with other wastes which are present.
- The waste characterization information and available analytical data to ensure that the waste material does not contain any specific waste codes, chemicals, or properties which are prohibited at GMF by permit.

All profiles for wastes shall be approved by the Facility Manager or designee. The profile shall be stored either electronically or in hardcopy form. The profile shall be signed by the generator or the generator's representative. The signature can be electronic. Following approval of the candidate waste stream, the generator is notified in writing that GMF has the appropriate permits for, and shall accept the waste stream in accordance with 40 CFR 264.12(b).

2.1.1.6 Waste Recertification

At a minimum, the profile evaluation shall be repeated when a generator notifies the GMF that the process generating the waste has changed (e.g., when the raw materials to the process have changed), if GMF has reason to suspect that the waste is in non-conformance with profile documentation, and at least annually (Facility Profiles, site generated wastes, are exempt from the annual requirement).

For an annual recertification, the generator shall be required to certify that the process has not changed.

If it is found that a waste arrives at the facility after the profile has expired and it is found the profile was current when the material was shipped by the generator, then the material may be accepted by the facility without first obtaining a re-certification since the profile was current at the time of shipment.

2.1.1.7 Waste Verification

On the initial load, and annually thereafter, the characteristics of each profiled waste shall be verified utilizing the analyses outlined on Table C-1 as well as the applicable analysis of parameters found in Table C-2. Listed wastes with constituents the generator certifies, as meeting treatment standards will be analyzed to verify the generator certification. If GMF is treating the constituents of concern, the verification process may be completed on the treated waste per 6.2.2. If there is reason to believe that the characteristics of the waste have changed, then additional analysis listed in Table C-2 can be required. This shall ensure that the wastes or treated wastes are in compliance with the applicable treatment standards set forth in 40 CFR §268.40 through §268.49. Analysis provided by Aragonite, for incinerator residue from the Aragonite incinerator can be used in lieu of performing any analysis required by this WAP such as: incoming load samples and annual recertification samples. A visual verification that the waste matches the profile description shall be made on all loads, as necessary, upon arrival at the facility.

If the waste is approved for management at the facility, a unique identification number shall be assigned to the waste stream. This number shall be used to identify the waste through the subsequent stages of the waste management process.

2.1.2 Load Acceptance and Handling of Discrepancies:

2.1.2.1 Load Acceptance

If the waste profile is approved, the waste can be scheduled for shipment to the facility. Upon arrival at the facility, the waste shall be inspected, sampled, and analyzed for the appropriate Table C-1 parameters prior to it being accepted or commingled with other waste streams or treated. This serves the purpose of comparing the physical or the fingerprint waste characteristics of the actual load with those determined in the profile approval process and those listed on the waste manifest and thus that the waste received

is the waste that was profiled. This allows proper disposition of the waste for storage and/or treatment. Facility-generated wastes are not subject to the incoming load procedures described in this Section.

Incoming load samples taken at Aragonite or Clive or other Clean Harbors locations and their analysis can be used in lieu of taking samples of the waste when it arrives at GMF. The analysis shall be performed using methods equivalent to those required for incoming load samples specified in this WAP. The results of the analysis can be sent to GMF prior to the arrival of the first shipment or with the first shipment. Example: Aragonite receives a waste and then ships this waste to GMF for management. When the waste arrives at GMF, it may be accepted without taking additional incoming load samples provided the analytical results conform with the approved profile.

A sample of waste taken by the generator or designee, in the presence of a Clean Harbors employee and sent to a suitable laboratory with a chain-of-custody, the analysis of that sample can be used not only as a pre-acceptance sample but as the incoming load sample also. The waste stream shall still have an approved profile issued by GMF. The facility taking the samples shall follow the same or more stringent sampling methods as prescribed in this WAP.

Acceptability of the waste shall be based on the requirements specified in Table C-3.

Waste shall not be accepted for storage (except as noted otherwise in this WAP), treatment, disposal, or any combination of these management activities, until the waste has been determined to match the profile or all discrepancies have been adequately resolved.

2.1.2.2 Discrepancies

There are two types of discrepancies that can occur under this provision; manifest discrepancies and load discrepancies. To check for manifest discrepancies the number of containers, or the weight of the bulk shipment is reconciled with the manifest. The number of containers shall be correct; there is no tolerance. The actual weight of bulk shipments must be within $\pm 10\%$ of the weight noted on the manifest. If either of these conditions is exceeded, the manifest is considered discrepant and actions shall be taken to reconcile the discrepancy. The manifest discrepancy shall be resolved with the generator or the generators authorized representative and will be noted on the manifest, which becomes part of the operating record. If the discrepancy is not resolved within 15 days, the facility will notify, in writing, the Executive Secretary of the Utah Solid & Hazardous Waste Control

Board.

Load discrepancies are determined by comparing the analyses of incoming load samples to the profile. At a minimum, samples from incoming loads are subjected to the appropriate analyses in Table C-1 to verify that each shipment matches the waste profile. Tolerance limits for these parameters have been established in order to aid in the conformance evaluation. Table C-3 contains the degree of agreement with the initial analyses for the parameters in Table C-1.

Should a particular value or values fall outside of the specified tolerance limits, this shall be considered a load discrepancy and requires further investigation and/or analyses to resolve the discrepancy. One or more of the following actions shall occur to resolve the discrepancy:

- The sampling and analytical data are reviewed to verify that they are indeed correct.
- Additional analyses can be conducted in order to resolve discrepancies or to re-profile the waste.
- The generator or authorized representative is contacted. In cases where the waste is amenable to storage or treatment at the facility the discrepancy is resolved with the generator or authorized representative. This may involve creating a new profile for the waste or updating the existing profile.

The waste can be accepted if the discrepancy is resolved. The resolution of the discrepancy shall be clearly indicated in the operating record.

Waste that cannot be accepted is either returned to the generator or shipped to another facility that can appropriately store or treat the waste.

2.2 Lab Packs:

Lab packs are small containers of hazardous waste in over-packed drums as described in R315-8-14.9. Lab packs shipped to the facility shall be put together to meet the following criteria:

- DOT approved containers.
- All chemicals that are placed into a lab pack shall be segregated based on their

compatibility in accordance with 49 CFR 173.12.

- A suitable packing material, usually spill absorbent, diatomaceous earth or sawdust, shall be used in sufficient volume to prevent rupture of inner containers and absorb any liquids should individual jars or cans within the lab pack rupture.
- Shall have a maximum inner-container size of five gallons (50 pounds).
- Water reactive material can be received in lab packs if DOT packing requirements are met. No internal container can exceed four liters if water reactive.

Lab packs can be repackaged as necessary in order to conform to R315-13, outside disposal site acceptance and DOT shipping criteria, or to meet GMF storage, treatment, and landfill requirements.

2.2.1 Profile Approval Process:

There are two types of lab pack profiles. The first type is a lab pack profile and the profile approval process shall be the same as that described in Section 2.1.1 with the following exception. An inventory sheet for each lab pack shall be provided in addition to the standard profile information. All the chemicals shall be inventoried as the lab packs are put together; subsequently, the contents of each lab pack shall be known. The inventory shall be approved as part of the profiling procedure. The treatment parameters, if required, shall be determined from the inventory sheets rather than from analysis of a sample. Samples shall not be required.

The second type of lab pack profile is called a generic lab pack profile. It is designed for generators who will be sending loads of lab packs on an ongoing basis. To start the process for these profiles, the generator need only provide the generator information on the Profile. A number shall be assigned to this profile sheet but no approval to send any waste is given at this time. As loads are prepared for shipment to the facility, the generator shall provide the inventory sheets for each batch to be shipped. The generator shall also provide the remaining required information from the Profile listed in Section 2.1.1 for that batch of lab packs. Approved lab packs shall have the profile approval information indicated on each inventory. After the inventory sheets are reviewed and approved, the generator shall be notified of each lab pack that may be shipped to GMF.

2.2.2 Load Acceptance and Handling of Discrepancies:

There are three types of discrepancies that can occur under this provision: manifest discrepancies, load discrepancies, and packing discrepancies.

2.2.2.1 Manifest Discrepancy

Acceptance for storage shall include checking for a manifest discrepancy, i.e., a piece count. If a discrepancy is discovered, it will be handled as a manifest discrepancy as described in Section 2.1.2.

2.2.2.2 Load Discrepancy

An inventory list shall accompany each lab pack identifying the quantity of each material. For each lab pack received, the accompanying inventory sheet shall be compared against the approved profile to ensure the waste conforms to the approved profile. No sampling or analysis is required. The profile inventory sheets shall be compared either against the inventory sheets sent with the manifest paperwork or the sheets on the drums. Differences between the approved profile inventory sheets and those inventory sheets accompanying the load are load discrepancies. These differences are additions of new chemical compounds, increases or decreases in quantity of chemicals (Table C-2) by more than 10%, or both, from the approved profile.

Waste shall not be accepted for storage or treatment until any manifest and load discrepancies have been adequately resolved. The actions that shall occur to resolve the discrepancies are outlined in Section 2.1.2. The resolution of any discrepancies shall be clearly indicated in the operating record.

2.2.2.3 Packing Discrepancy

The third type of discrepancy, packing discrepancies, shall be determined following acceptance of the waste but prior to on-site treatment and disposal.

The contents of lab packs shall be verified by unpacking them and comparing the contents to the load inventory sheets. At least ten percent of the lab packs for each manifest line item shall be verified with a minimum of one lab pack per manifest. Discrepancies will be reconciled with the waste generator. No sampling or analysis of samples shall be required. Lab packs generated on site shall not be subject to the verification procedure.

Any unacceptable material shall be manifested off-site to an approved transfer, treatment or disposal facility. The generator will be notified of this subsequent action.

2.3 Debris as defined in 40 CFR 268.2:

This section is designed for characterizing waste that is debris as defined by 40 CFR 268.2.

It is “solid material exceeding a 60 mm” (approximately 2-inches) “particle size that is intended for disposal and that is: A manufactured object; or plant or animal matter; or natural geologic material. However, the following materials are not debris: Any material for which a specific treatment standard is provided in Subpart D, Part 268, namely lead acid batteries, cadmium batteries, and/or air emission residues; and intact containers of hazardous waste that are not ruptured and that retain at least 75% of their original volume.

A mixture of debris that has not been treated to the standards provided by R315-13-1 and other material shall be subject to regulation as debris if the mixture is comprised primarily of debris, by volume, based on visual inspection.” Examples include steel plates, pipe, concrete pieces, duct work, empty drums, glass, rocks, sealed containers/chemical containing equipment such as: cathode ray tubes, non-PCB electrical equipment, animal wastes and parts, asbestos containing material (ACM), Tyvek® suits, rubber booties and gloves, and paper towels and/or mixtures of these.

Any material for which a specific treatment standard is provided in R315-13-1, namely lead acid batteries, cadmium batteries, and or air emission residues; and intact containers of hazardous waste that are not ruptured and that retain at least 75% of their original volume can be treated as debris under this section if they are not being treated and/or land disposed at GMF. That is, they shall only be stored at GMF prior to being shipped to another facility for treatment, disposal, or both.

2.3.1 Profile Approval Process:

The profile approval process for **debris** shall be the same as that described in Section 2.1.1 with the following exception. The generator can supply a picture or a written description (see Table C-1) of the waste stream instead of submitting a sample. If a sample is submitted, the facility shall develop the detailed written description or take a picture of the sample as described above, or can use the sample itself for verification of the physical appearance of the waste stream when the load arrives. The description of the waste on the profile may be used to satisfy the description requirements.

2.3.2 Load Acceptance and Handling of Discrepancies:

There are two types of discrepancies that can occur under this provision: manifest discrepancies and load discrepancies. To check for manifest discrepancies the number of containers or pieces shall be reconciled with the manifest. The number of containers or pieces shall be correct: there is no tolerance. The actual weight of bulk shipments shall be within $\pm 10\%$ of the weight noted on the manifest. If either of these conditions are not met the manifest shall be considered discrepant and actions shall be taken to reconcile the discrepancy. The manifest discrepancy shall be resolved with the generator and shall be noted on the manifest, which becomes part of the operating record. If not resolved within 15 days, the facility shall notify, in writing, the Executive Secretary of the Utah Solid & Hazardous Waste Control Board.

Prior to accepting the load, the contents of containers shall be inspected for physical appearance at the frequency specified in Section 4.8 or 4.10. The person inspecting the material shall have reviewed the photo, written description, or the sample of the waste stream from the approved profile prior to making the visual observation so that he/she can easily determine if the waste matches the profile. If there are any discrepancies, they shall be resolved according to the procedures in Section 2.1.2 prior to accepting the waste.

2.4 MSDS Wastes:

This category of wastes includes containerized material that is in its original packaging (as a product) or certified by the generator to be out-of-date or off-spec product or a residue and debris from the clean-up of spills of a chemical substance(s) or commercial product(s). The containers shall be labeled so that the contents are easily identified and the MSDS shall be available. For the spill clean-up material, the generator shall certify in writing (can be the waste profile) what was spilled and provide the MSDS for the spilled material.

2.4.1 Profile Approval Process:

The profile approval process for this category of wastes shall be identical to that for routine wastes (2.1.1) except that the MSDS would be submitted instead of a sample of the waste stream.

The treatment parameters (those specified on Table C-2), if needed, shall be determined from the MSDS, description of the material, generating process, generator knowledge, literature searches, and good judgement rather than from analysis of a sample.

2.4.2 Load Acceptance and Handling of Discrepancies:

There are two types of discrepancies that can occur under this provision: manifest discrepancies and load discrepancies. To check for manifest discrepancies, the number of containers shall be reconciled with the manifest. The number of containers shall be correct: there is no tolerance. If there is a difference, the manifest is considered discrepant and actions shall be taken to reconcile the discrepancy. The manifest discrepancy shall be resolved with the generator and will be noted on the manifest, which becomes part of the operating record. If not resolved within 15 days, the facility will notify, in writing, the Executive Secretary of the Utah Solid & Hazardous Waste Control Board.

Prior to accepting the load, each container shall be inspected to ensure that the labeling is consistent with the MSDS. If there are any discrepancies, this is called a load discrepancy, which will be resolved according to the procedures in Section 2.1.2 prior to accepting the waste.

2.5 Transfer Operations:

These are wastes that are manifested to another facility but shall be held temporarily (ten days or less, where day one is the first calendar day after arrival and day 10 ends at midnight) at the facility during transit. The waste can be part of a load for which some of the material is destined for GMF. When this material is shipped off-site, the original manifest accompanies the waste. This differs from wastes that are accepted for storage only and then subsequently shipped to another facility. A new manifest shall be generated with the facility as the generator in this situation.

2.5.1 Profile Approval Process:

No profile approval procedures shall be necessary.

2.5.2 Load Acceptance and Handling of Discrepancies:

The load is not accepted but rather is held on a temporary basis. There are no requirements for sampling or ensuring the wastes are compared to a profile. The facility shall comply with the transporter requirements in Subpart C of 40 CFR §263 for these wastes. Also, the containers shall be inspected to ensure they are in good condition. The containers shall be segregated from other profiled wastes, clearly identified as 10-day wastes along with the date of arrival. Issues of compatibility shall be handled in the same manner as if on a transport vehicle using shipping paper information.

2.6 Non-Hazardous / Non-RCRA / Non-TSCA Regulated Wastes:

These include household hazardous wastes and other wastes excluded from regulation or not regulated under RCRA or as defined under R315 of the Utah Administrative Rules. These shall be referred to hereafter as “NH” wastes.

2.6.1 Profile Approval Process:

The profile approval procedures for NH wastes shall be identical to those for Debris (Section 2.3.1) except that a statement from the generator certifying that the waste is “non-hazardous” is also required. If the profile contains information verifying the regulatory status of the waste as non-RCRA or equivalent, the profile will suffice as the pre-approval certification.

2.6.2 Load Acceptance and Handling of Discrepancies:

There are two types of discrepancies that can occur under this provision: manifest discrepancies and load discrepancies. To check for shipping paper discrepancies the number of containers or pieces shall be reconciled with the manifest. The number of containers or pieces shall be correct: there is no tolerance. The actual weight of bulk shipments shall be within $\pm 10\%$ of the weight noted on the shipping paper. If either of these conditions are not met, the shipping paper shall be considered discrepant and actions shall be taken to reconcile the discrepancy. The shipping paper discrepancy shall be resolved with the generator and shall be noted on the shipping paper, which becomes part of the operating record. If not resolved within 15 days, the facility shall notify, in writing, the Executive Secretary of the Utah Solid & Hazardous Waste Control Board.

Prior to accepting the load, the contents of containers shall be inspected for physical appearance at the frequency specified in Section 4.8, 4.9 or 4.10. The person inspecting the material shall have reviewed the photo, detailed written description, or the sample of the waste stream from the approved profile prior to making the visual observation so that he/she can easily determine if the waste matches the profile. If there are any discrepancies, they will be resolved according to the procedures in Section 2.1.2 prior to accepting the waste.

2.7 Storage Only Wastes:

These include wastes stored at GMF that are not being treated and/or disposed at GMF.

2.7.1 Profile Approval Process:

The profile approval process shall be the same as for routine waste except that sampling and lab analysis shall not be required on the initial shipment or thereafter. A visual inspection shall be required on all shipments.

2.7.2 Load Acceptance and Handling of Discrepancies:

If the waste profile is approved, the waste can be scheduled for shipment to the facility. Upon arrival at the facility, the shipping information on the waste containers, the shipping information on the manifest and the shipping information on the waste profile shall be compared.

There are two types of discrepancies that can occur under this provision: manifest discrepancies and load discrepancies. To check for manifest discrepancies the number of containers, or the weight if it is a bulk shipment, shall be reconciled with the manifest. The number of containers shall be correct; there is no tolerance. The actual weight of bulk shipments shall be reasonable when compared to the manifested weight. (For bulk containers, the empty weight of the container will be estimated to make this determination) If either of these conditions are exceeded the manifest shall be considered discrepant and actions shall be taken to reconcile the discrepancy. The manifest discrepancy will be resolved with the generator or their authorized representative and will be noted on the manifest, which becomes part of the operating record. If the discrepancy is not resolved within 15 days, the facility will notify, in writing, the Executive Secretary of the Utah Solid & Hazardous Waste Control Board.

Load discrepancies shall be determined by making the shipping information comparison described earlier. At a minimum the shipping name, waste codes and type and size of container shall match. Should any of these not match exactly, this is considered a load discrepancy and requires further investigation to resolve the discrepancy. One or more of the following actions occur to resolve the discrepancy: The generator or authorized representative is contacted. In cases where the waste is amenable to storage, treatment, or both, at the facility, the discrepancy is resolved with the generator or authorized representative. This can involve correcting the manifest / LDR papers, creating a new

profile for the waste, updating the existing profile, or any combination of these corrections. Waste which is not amenable to acceptance (e.g., unacceptable wastes described in Section 1.3.2) shall be rejected.

The waste can be accepted if the discrepancy is resolved. The resolution of the discrepancy shall be clearly indicated in the operating record. Waste, which is not amenable to acceptance, shall be returned to the generator or shipped to another facility that can appropriately manage the waste.

2.8 Storage Wastes for Commingling

GMF shall also require the chemical analyses from Table C-1, except for waste types that do not require samples, before commingling.

Table C-1
Pre-acceptance, Storage and Verification (Fingerprint) Analyses
When Sampling is Required

| Parameter | Rationale for Selection |
|--|--|
| Physical Description | Used to determine the general characteristics of the waste stream. This facilitates subjective comparison of the load sample with the approved profile. |
| pH Screen | Required of all aqueous waste streams, it is used to indicate the corrosivity of the waste to ensure proper storage of the waste. It is also used as a parameter to compare the load sample to the approved profile. |
| Water Reactivity Screen | Used to determine whether the waste has a potential to react with water to generate heat, flammable gases, or other products. Ensures prohibited waste is not accepted for storage or treatment unless approved by the Executive Secretary. It is also used as a parameter to compare the load sample to the approved profile. |
| Reactive Sulfides Screen | Used to indicate whether the waste produces hydrogen sulfide upon acidification below pH 2. It is also used as a parameter to compare the load sample to the approved profile. Only run on wastes that have a pH>2.0. Waste containing total releasable sulfide with concentrations less than 500 ppm are considered non-reactive. Not applicable to azide waste streams, or others as approved by the Executive Secretary. |
| *Ignitability / VOC Screen (TLV Sniff or equivalent) | Used to indicate the fire-producing potential of the waste, and to indicate whether the waste might be a RCRA ignitable waste or regulated as flammable or combustible by the US DOT. This test can be applied to all waste liquids, semi-solids or solids. The screen will be supplemented with the flash point test for those materials exceeding 200 ppm if they are destined for land disposal. Not needed if ignitability test is performed. If < 500 ppm, the waste may be processed. If not, the reading must be resolved with the generator or rejected. Not required for wastes destined for incineration if the waste is treated as ignitable waste. |
| *LEL / VOC Screen | May be used in lieu of the TLV Sniff. It or the TLV sniff or equivalent, must be used for all wastes which are not required to be sampled that will be treated in the stabilization system or stored in a tank. GMF generated waste is excluded from this requirement. It is used to detect volatile organics in the waste. A reading of > 10% LEL requires the TLV Sniff test be done over the waste. If < 500 ppm, the waste may be processed. If not, the reading must be resolved with the generator or rejected. |

| | | |
|--|----------|--|
| Reactive Screen | Cyanides | Indicates whether the waste produces hydrogen cyanide upon acidification below a pH of 2. It is also used as a parameter to compare the load sample to the approved profile. Only run on wastes that have a pH>2.0. Wastes containing total releasable cyanide with concentrations less than 250 ppm are considered non-reactive. Not applicable to azide waste streams, or others as approved by the Executive Secretary. |
| Oxidizer Screen | | A general qualitative test used to determine if a waste is an oxidizer. Oxidizers have the potential to react with a wide range of waste streams and therefore often need to be segregated. It is also used as a parameter to compare the load sample to the approved profile. Only run on wastes that have a pH>2.0. |
| Radioactivity Screen | | It is used to help identify prohibited wastes. It is also used as a parameter to compare the load sample to the approved profile. |
| Specific Gravity | | It is used for liquids to compare the load sample to the approved profile. |
| Waste Compatibility Qualitative Assessment | | As part of the profile approval procedures, the chemical characteristics (pH, corrosivity of non-aqueous wastes, reactivity, flammability, etc.) of waste streams are assessed by waste acceptance personnel. This assessment is based on information about the waste, not necessarily on any analyses. |
| Supplemental Discretionary Analyses (SDAs) | | Used when GMF determines that additional analysis is required to properly manage waste. Table C-2 |
| HOC Screen (Note 1) | | Used to detect the presence of Halogenated Organic Compounds or leachable Halogenated Organic Compounds (HOC) that might adversely affect the cell liner. Any one of the three SK methods may be used. Required only for wastes destined for land disposal at GMF. |

Note 1: Frequency of Analysis

- a. Either as part of the pre-acceptance process, upon arrival of the first shipment of waste or prior to disposal of the first shipment of waste after initial profile approval, the HOC Screen, TCLP extract H(if approved) or a specific analysis for those chemicals listed in Appendix 3 of this WAP will be performed on all wastes that require incoming load samples and that are designated to be land disposed at GMF. The result of this test on a batch of wastes that contains multiple waste streams is valid for each individual waste stream in the batch.
- b. The HOC test shall be repeated annually as part of the annual verification testing protocol, or repeated more frequently i.e. liquid/sludge drums as required.

- c. For the drummed liquid / sludge waste, incoming load analysis will include the HOC screen (or TCLP HOC Screen if approved) or a specific analysis for those chemicals listed in Appendix 3 of this WAP at the same frequency that finger print samples are required. Pre-disposal HOC sampling may be done as described in Note 3 of this section.

Note2:

In order for GMF to use TCLP as a substitute method for the HOC screen (CH Method 22A or 22B), GMF will be required to submit and carry out a plan to show the difference in results between TCLP analytical results and GMF Method 22A or 22B analytical results for the same waste and to determine the equivalent TCLP value that corresponds to a waste with 1000 ppm HOCs. Approval of the TCLP plan and results is required before GMF is allowed to activate TCLP testing for HOCs. This requirement is for any TCLP HOC testing GMF intends to use.

Note 3:

Treated wastes destined for the landfill may be verified for HOC compliance in lieu of incoming load verification. The TCLP HOC Screen may be used if the requirements of Note 1 are met.

Table C-2
Treatment & Supplemental Analysis

| Parameter | Rationale for Selection |
|--|---|
| RCRA Metals (As, Ba, Be, Cd, Cr, Pb, Hg, Ni, Ag, Sb, Se, Tl, Va, Zn) | Analysis of one or more of these metals maybe required in order to demonstrate compliance with LDR standards. |
| Ignitability | Indicates the fire-producing potential of the waste and determines whether the waste is RCRA ignitable. It is also used as a parameter to compare the load sample to the approved profile. |
| Reactive Cyanide (Releasable) | Ensures waste is handled safely and determines if treatment may be required |
| Reactive Sulfide (Releasable) | Ensures waste is handled safely and determines if treatment may be required |
| Total Cyanide | May be required to demonstrate compliance with LDR standards. |
| Amenable Cyanide | May be required to demonstrate compliance with LDR standards. |
| No Free Liquids by Paint Filter | Analysis is necessary to ensure free liquids are not placed into the landfill |
| Specific Organic Analysis | Gas chromatography and gas chromatography/mass spectrometry may be used to identify and quantify specific regulated organic compounds, i.e. listed waste constituents of concern, characteristic wastes, etc.) when the generator is unaware of waste stream's composition. |

| <p align="center">Table C-3 Methods and Tolerance Limits</p> | |
|--|--|
| Parameter Limits | Tolerance |
| Physical Description | Must be consistent with profile. |
| Specific Gravity | ± 20% |
| pH Screen | ± 3 pH units, as long the profile pH is >2 and < 12.5. If the profile pH is < 2 or > 12.5, the incoming load sample must be the same. |
| TLV-Sniff | if >200 ppm, and destined for landfill, flash point must be run. If TLV-Sniff is <200, the flashpoint is considered >140°F and it is OK for direct landfill. Must be < 500 ppm if destined for storage or treatment in tanks. |
| Water Reactivity Screen | No tolerance; load samples must agree with profile |
| Reactive Sulfides Screen | Must be consistent with profile ^{1, 2} |
| Reactive Cyanides Screen | Must be consistent with profile ^{1, 3} |
| Ignitability | Must be consistent with profile, i.e. if profile is reported as being >140°F it must test >140°F. |
| Radioactivity Screen | No tolerance; load samples must be less than 40 microR/hr over background unless authorization is obtained as described in the Prohibited Materials section of this WAP. No explanation is required for wastes profiled with a positive radioactive screen and arriving with a negative screen. |
| Oxidizer Screen | Must be consistent with profile. ¹ |
| HOC Screen or Specific Analysis of those chemicals in Appendix 3 of this WAP | The limit is 1000 ppm HOCs or equivalent leachable HOCs by either method. If the screen shows > 1000 ppm or equivalent leachable HOC, the specific Appendix 3 analysis may be used to determine if the waste contains > 1000 ppm of those compounds or the equivalent that are leachable. If it does, the waste will either be retreated until it no longer contains >1000 ppm of these compounds or the equivalent leachable HOCs or it will not be land disposed at GMF. |

Notes:

1. For negative to positive results, the generator will be contacted for a qualitative explanation of the difference. The answer will be documented in the facility operating record.
2. If this material is to be disposed of directly into the landfill, an increase above 500 ppm for Sulfide will

require explanation, further analysis or, potentially, different handling.

3. If this material is to be disposed of directly into the landfill, an increase above 250 ppm for CN will require explanation, further analysis or, potentially, different handling.

3 TEST METHODS:

The test methods to measure the parameters discussed throughout this plan are currently identified in, but not limited to, those listed in Table C-4. Whenever possible these are established methods or modified methods from Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, US EPA, 1986 and its updates. However, SW-846 does not have methods for all the parameters specified; nor are those methods necessarily the most accurate or sensitive. In these particular cases, other established methods are used, including American Society for Testing and Materials (ASTM); and EPA 600/4-79-020, Methods for Chemical Analysis of Water and Wastes; Standard Methods for Examination of Water and Wastewater, Latest Edition; EPA 40 CFR, 136, App. A Methods; EPA Contract Laboratory Program, Inorganic SOW and Organic SOW Methods. Where other practical methods are not available, methods have been developed. These methods are described at the end of this section or are described in manufacturer literature. GMF and the suitable laboratories GMF uses, are authorized to use the methods and method updates / improvements that the State of Utah Bureau of Laboratories (BLI) and/or NELAP certify as soon as the request is made to the BLI and/or NELAP for the lab to be certified for that method.

| Table C-4 Analytical Parameters and Associated Methods | | |
|--|----------------------|------------------|
| PARAMETER | METHOD NUMBER | REFERENCE |
| *Acid-Base Partition Cleanup | 3650 | (1) |
| *Acid Digestion of Sediments, Sludges, and Soils | 3050 | (1) |
| *Acid Digestion of Aqueous Samples and Extracts for Total Metals for Analysis by Flame Atomic Absorption Spectroscopy or Inductively Coupled Plasma Spectroscopy | 3010 3010-MOD | (1) |
| *Acid Digestion of Aqueous Samples and Extracts for Total Metals for Analysis by Furnace Atomic Absorption Spectroscopy | 3020 | (1) |
| *Alumina Column Cleanup | 3610 | (1) |
| *Aluminum (AA) | 7020 | (1) |
| *Aluminum (ICP) | 6010 | (1) |
| *Antimony (ICP) | 6010 | (1) |
| *Antimony (AA) | 7040 7041 | (1) (1) |
| *Aromatic and Halogenated Volatile Organics | 8021 | (1) |
| *Arsenic (ICP) | 6010 | (1) |
| *Arsenic (AA) | 7060 7061 | (1) (1) |
| *Ash | D482 | (2) |
| *Atomic Absorption Spectroscopy | 7000 | (1) |
| *Barium (ICP) | 6010 | (1) |
| *Barium (AA) | 7080 7081 | (1) (1) |

| Table C-4 Analytical Parameters and Associated Methods | | |
|---|----------------------|------------------|
| PARAMETER | METHOD NUMBER | REFERENCE |
| *Beryllium (ICP) | 6010 | (1) |
| *Beryllium (AA) | 7090 | (1) |
| | 7091 | (1) |
| *Bromide | 9056 | (1) |
| Bulk Density, Solids | D5057 | (2) |
| *Cadmium (ICP) | 6010 | (1) |
| *Cadmium (AA) | 7130 | (1) |
| | 7131 | (1) |
| *Calcium (ICP) | 6010 | (1) |
| *Calcium (AA) | 7140 | (1) |
| *Carbamate pesticides (LCMS) | 8321 | (1) |
| *Chloride | 9253 | (1) |
| *Chloride (Ion Chromatography) | 9056 | (1) |
| *Chlorinated Herbicides | 8151 | (1) |
| | 8151-MOD | (1) |
| *Chromium (ICP) | 6010 | (1) |
| *Chromium (AA) | 7190 | (1) |
| | 7191 | (1) |
| *Cobalt (ICP) | 6010 | (1) |
| *Cobalt (AA) | 7201 | (1) |
| *Copper (ICP) | 6010 | (1) |
| *Copper (AA) | 7210 | (1) |
| | 7211 | (1) |

| Table C-4 Analytical Parameters and Associated Methods | | |
|---|---|------------------|
| PARAMETER | METHOD NUMBER | REFERENCE |
| *Continuous Liquid-Liquid Extraction | 3520 | (1) |
| * Dithiocarbamates as Ziram, total | 630 and 630-MOD / Modified CDFA Procedure | (3) and (12) |
| *Fluoride (Ion Chromatography) | 9056 | (1) |
| *Fluoride | 340.2 | (3) |
| | 5050 | (1) |
| | D3987 | (2) |
| *Florisil Column Cleanup | 3620 | (1) |
| *Gas Chromatography | 8000 | (1) |
| *Gas Chromatography/Mass Spectrometry for Volatile Organics | 8260 | (1) |
| *Gas Chromatography/Mass Spectrometry for Semi-volatile Organics | 8270 | (1) |
| *Gel-Permeation Cleanup (GPC) | 3640 | (1) |
| *Halogenated Volatile Organics | 8010 | (1) |
| | 8021 | (1) |
| *Headspace | 3810 | (1) |
| *Heat of Combustion (BTU) | D240 | (2) |
| | D240-MOD | (2) |
| | 5050 | (1) |
| HOC Screen (Oil, Soil, Water) | 9078 | (1) |
| HOC Screen (Oil) | D-5384, 9077 | (2), (1) |
| *HOC Screen | 22 a*/b | (4) |
| | 9022 | (1) |
| | 9023 | (1) |
| | | |

| Table C-4 Analytical Parameters and Associated Methods | | |
|---|----------------------|------------------|
| PARAMETER | METHOD NUMBER | REFERENCE |
| *Ion Chromatography | 9056 | (1) |
| Ignitability , Setaflash | D3828 | (2) |
| Ignitability , Penske Martin, actual flashpoint | 1010 | (1) |
| Ignitability Liquid, actual flashpoint, no suspended solids | 1020 | (1) |
| Ignitability Liquid, at 140°F, no suspended solids | 8b | (4) |
| Ignitability Liquid or Solids, room temperature | D4982 | (2) |
| Ignitability Sludge, at 140°F | 8b | (4) |
| *Iron (AA) | 7380 | (1) |
| | 7381 | (1) |
| *Iron (ICP) | 6010 | (1) |
| *Lead (ICP) | 6010 | (1) |
| *Lead (AA) | 7420 | (1) |
| | 7421 | (1) |
| LEL | 14 | (4) |
| Liquids, Sludge Compatibility (see note 3) | D5058 | (2) |
| *Magnesium (ICP) | 6010 | (1) |
| *Magnesium (AA) | 7450 | (1) |
| *Manganese (ICP) | 6010 | (1) |
| *Manganese (AA) | 7460 | (1) |
| | 7461 | (1) |
| *Mercury Cold Vapor (AA) | 7470 | (1) |
| | 7471 | (1) |
| | | |

| Table C-4 Analytical Parameters and Associated Methods | | |
|--|----------------------|------------------|
| PARAMETER | METHOD NUMBER | REFERENCE |
| *Microwave Assisted Acid Digestion of Aqueous Samples and Extracts | 3015 | (1) |
| *Microwave Assisted Acid Digestion of Sediments, Sludges, Soils and Oils | 3051 | (1) |
| *Moisture (organic liquids) | D1533 | (2) |
| *Moisture (Inorganics) | 2540 | (5) |
| *Molybdenum (ICP) | 6010 | (1) |
| *Molybdenum (AA) | 7480 | (1) |
| | 7481 | (1) |
| *Nickel (ICP) | 6010 | (1) |
| *Nickel (AA) | 7520 | (1) |
| *Total Kjeldahl Nitrogen | D3590 | (2) |
| *Nitrate/Nitrite Ion Chromatography | 9056 | (1) |
| *Nitrogen, Total | 7.025-7.031 | (7) |
| *Nonhalogenated Volatile Organics | 8015 | (1) |
| *Organic Extraction and Sample Preparation | 3500 | (1) |
| *Organochlorine Pesticides | 8081 | (1) |
| *Organophosphorus Compounds by Capillary Column GC | 8141 | (1) |
| Oxidizer Screen | D4981 | (2) |
| Paint Filter | 9095 | (1) |
| *PCDD | 8280 | (1) |
| | 8290 | (1) |
| *PCDF | 8280 | (1) |

| Table C-4 Analytical Parameters and Associated Methods | | |
|---|----------------------------|------------------|
| PARAMETER | METHOD NUMBER | REFERENCE |
| | 8290 | (1) |
| *PCBs | 8081 | (1) |
| | 8082 | (1) |
| *PCB and Pesticides (GC/MS) | 680 | (6) |
| *PCB Wipes | 5503 | (8) |
| pH Screen | D4980 | (2) |
| pH Electrometric | 9040 | (1) |
| pH Paper | 9041 | (1) |
| pH Waste | 9045 | (1) |
| pH Solids | 9045 | (1) |
| Physical Description | D4979 | (2) |
| *Potassium (ICP) | 6010 | (1) |
| *Potassium (AA) | 7610 | (1) |
| *Purge-and-Trap | 5030 | (1) |
| Radioactivity Screen | 6 / 9916 MOD | (4) |
| Reactive Cyanide Screen (see note 2) | D5049 | (2) |
| Reactive Sulfide Screen Confirmation (see note 2) | D4978 | (2) |
| *Cyanide (Releasable) | Chapter 7, Sec. 7.3.3.2 | (1) |
| *Sulfide (Releasable) | Chapter 7 Sec. 7.3.4.2 | (1) |
| *Selenium (ICP) | 6010 | (1) |
| *Selenium (AA) | 7740 | (1) |

| Table C-4 Analytical Parameters and Associated Methods | | |
|---|----------------------|------------------|
| PARAMETER | METHOD NUMBER | REFERENCE |
| | 7741 | (1) |
| *Separatory Funnel Liq-Liq Extraction | 3510 | (1) |
| *Silica Gel Cleanup | 3630 | (1) |
| *Silver (ICP) | 6010 | (1) |
| *Silver (AA) | 7760 | (1) |
| | 7761 | (1) |
| *Sodium (ICP) | 6010 | (1) |
| *Sodium (AA) | 7770 | (1) |
| Solids Compatibility (see note 3) | N/A | (9) |
| | D5058 | (2) |
| *Sonication Extraction | 3550 | (1) |
| *Soxhlet Extraction | 3540 | (1) |
| Specific Conductance | 120.1 | (3) |
| Specific Gravity | D1429 | (2) |
| Specific Gravity/ Bulk Density | D5057 | (2) |
| *Sulfides | 9030 | (1) |
| | 9031 | (1) |
| | 9034* | (1) |
| | 376.1 | (3) |
| *Sulfate Ion Chromatography | 9056 | (1) |
| *Sulfur | D2784 | (2) |
| | D1266 | (2) |
| *Sulfur Cleanup | 3660 | (1) |
| *Sulfuric Acid Cleanup | 3665 | (1) |
| *Thallium (ICP) | 6010 | (1) |
| | | |

| Table C-4 Analytical Parameters and Associated Methods | | |
|--|----------------------|------------------|
| PARAMETER | METHOD NUMBER | REFERENCE |
| *Thallium (AA) | 7841 | (1) |
| | 7840 | (1) |
| *Tin (ICP) | 6010 | (1) |
| *TCLP | 1311 | (1) |
| TLV Sniff | 5 5-MOD | (4) |
| *Total and Amenable Cyanide (Distillation) | 9010 | (1) |
| *Total and Amenable Cyanide (Colorimetric, Automated UV) | 9012 | (1) |
| *Titrimetric and Manual Spectrophotometric Determinative Methods for Cyanide | 9014 | (1) |
| *Total Organic Carbon | 9060 | (1) |
| *Total Halogen | 5050 | (1) |
| | 9253 | (1) |
| | 9056 | |
| | 9212 | |
| *Vanadium (ICP) | 6010 | (1) |
| *Vanadium (AA) | 7910 | (1) |
| | 7911 | (1) |
| *Viscosity | D2983 | (2) |
| *Volatile Organic Compounds | 21 | (10) |
| | 25 | (10) |
| | All Listed | (11) |
| Waste Compatibility Qualitative Assessment | 12 | (4) |
| *Waste Dilution | 3580 | (1) |
| Water Reactivity Screen (see note 1) | D5058 | (2) |
| | | |

| Table C-4 Analytical Parameters and Associated Methods | | |
|---|----------------------|------------------|
| PARAMETER | METHOD NUMBER | REFERENCE |
| *Zinc (ICP) | 6010 | (1) |
| *Zinc (AA) | 7950 | (1) |
| | 7951 | (1) |
| <i>* typically conducted at an off-site laboratory</i> | | |

TABLE C-4

ANALYTICAL PARAMETERS AND ASSOCIATED METHODS

- (1) Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA Publication SW-846 [3rd Edition (November, 1986), with current updates
- (2) American Society for Testing and Materials
- (3) Methods for Chemical Analysis of Water and Wastes, EPA 600/4-79-020
- (4) Facility Methods, not based on any standard method.
- (5) Standard Methods for the Examination of Water and Wastewater, Latest Edition, APHA, WEF
- (6) Alford-Steven, A.; Eichelberger, J.W. and Budde W.L. Method 680. Determination of Pesticides and PCBs in Water and Soil/Sediment by Gas Chromatography/Mass Spectrometry. Physical and Chemical Methods Branch. Environmental Monitoring and Support Laboratory Office of Research and Development. U.S. EPA, Cincinnati, Ohio 45268. November 1985.
- (7) Association of Official Analytical Chemists, 14th Edition
- (8) National Institute for Occupational Safety and Health
- (9) A Method for Determining the Compatibility of Hazardous Wastes, EPA-600/2-80-076, April, 1980
- (10) 40 CFR 60 Appendix A
- (11) 40 CFR 265.1085 (c)
- (12) Method 630 is for liquids. Method 630-MOD / Modified CDFA (California Department of Food and Agriculture) Procedure was developed for solids. Both rely on the fact that when dithiocarbamates are acidified, carbon disulfide is released. Method 630 is a colorimetric method while 630-MOD / Modified CDFA Procedure analyzes the headspace by gas chromatography using a FPD detector. Currently GMF could only find one commercial lab in the USA that analyzes for total dithiocarbamates in solids. That lab is E.M.A. Inc. (Environmental Micro Analysis) located in Woodland, CA. The modified method is theirs.

NOTES:

1. A significant temperature change as stated in paragraph 24.8 of ASTM method D5058-90 is defined as $\geq 15^{\circ}\text{C}$. The test does not apply to wastes already in contact with excess water, nor is a waste water reactive if the heat generation is due solely to a strong acid/base reaction as verified by pH analysis or heat of solution, i.e. lime is not water reactive. Occurrence of the reactions listed in paragraph 24.4 of ASTM method D5058-90 result in failure of the water reactivity test, except that formations of precipitates or emulsions are considered failures only if the ability to mix and pump the resulting liquids is impaired.
2. The test is not required for wastes with $\text{pH} < 2$.
3. A temperature rise as stated in paragraph 11.8 of ASTM method D5058-90 is defined as $\geq 15^{\circ}\text{C}$. Occurrence of the reactions listed in paragraph 11.7 of ASTM method D5058-90 result in failure of the compatibility test, except that formations of layers, precipitation, emulsification, or increases in viscosity are considered failures only if the ability to manage the resulting liquids is impaired.

Table C-4
Facility Methods
(continued)

Radioactivity Screen (GMF-6 / 9916-mod)

All incoming waste shipments will be monitored for radioactivity using a count rate meter with a Geiger-Mueller detector or equivalent. The detector shall be operated in accordance with the manufacturer's recommended procedures. Detectors shall be calibrated at least annually and after repair.

The detector window shall be placed within one (1) inch (but not in contact) of the sample surface of bulk materials until a steady, time weighted count rate is obtained.

Results of surveys are to be recorded in terms of microR/hr. Any waste found to have a reading of 40 microR per hour or more over background shall not be accepted without receiving authorization from the Utah Division of Radiation Control. A background reading shall be taken for each sampling day and the measurement recorded.

3.1 Ignitability Screen for Sludges (GMF-8b)

The ignitability screen for sludges is determined using a modified version of EPA SW-846 Method 1010. Instead of an actual flash point determination as outlined in the 1010, the sludge is heated in the test cup to 140°F. When the temperature in the cup reaches 140°F, the flame is applied to the sample. A flash/no-flash measurement shall be determined and recorded as positive or negative.

3.2 Ignitability Screen for Liquids, Solids and Sludges (GMF-9401)

The setaflash method is based upon ASTM D3828. This is a flash/no flash screening test suitable for liquids, solids, highly viscous liquids, and sludges. The sample is introduced into the cup of the apparatus by opening the cover and adding the sample. The tester is set and maintained at fixed threshold temperatures. After one (1) minute, a test flame of a definite size is applied and an observation made as to whether or not an unambiguous flash occurs. A flash/no-flash measurement shall be determined and recorded as positive or negative.

3.3 Waste Compatibility Qualitative Assessment (GMF-12)

As part of the pre-approval procedures, the chemical characteristics (pH, reactivity, flammability, etc.) of waste streams are assessed by waste acceptance personnel from the profile, to compare compatibility of the waste with shipping and storage containers. This assessment shall be based on information about the waste, not on any analytical analyses.

3.4 LEL (GMF-14)

This is one method used to determine the presence of combustible vapors / volatile organic compounds dissipating from a waste. A positive result (failure) is indicated by a reading of greater than 10% LEL on the instrument. A failure requires that a flash point analysis be performed to test for ignitability if the material is destined for direct land disposal or tank storage at GMF. If destined for storage or treatment in tanks, the TLV Sniff test (GMF-5) must also be performed.

Containers of waste shall be opened enough to insert the probe. The instrument pulls any vapors above the waste into the detectors. Sufficient time shall be allowed to clear the air from the sample line. The container is sampled immediately after opening. The probe inlet shall be placed close to, but not touching, the waste in the container. The result (POS/NEG) shall be documented in the logbook. Care shall be exercised to ensure that drafts are avoided in the area that is being sampled as this can cause a false negative result. The test is not to be run on materials that will poison the detector.

The instrument will be calibrated according to the procedures and at the frequency specified by the manufacturer. It will be operated according to the instructions provided by the manufacturer. Daily sensitivity checks and continuing sensitivity checks every twentieth sample will be conducted. The test will not be run with an instrument that is not functioning correctly.

3.5 COMBUSTIBLE VAPOR TEST (TLV SNIFF) (GMF-5)

This is another method used to determine the presence of volatile organic compounds dissipating from a waste. A reading of greater than 200 ppm on the instrument (FID, PID and or Catalytic Combustible gas and vapor sensing instrument or equivalent) requires that a flash point analysis be performed to test for ignitability if the material is destined for direct land disposal. A reading of < 500 ppm on the instrument (FID, PID and or Catalytic

Combustible gas and vapor sensing instrument or equivalent) is required if the material is destined for storage or treatment in tanks.

The sample container is opened enough to insert the probe and the probe is inserted immediately over the sample. The probe inlet shall be placed close to (within 0.5 cm), but not touching, the waste. Sufficient time shall be allowed to clear the air from the sample line. The result (POS/NEG) shall be documented in the lab record.

The instrument will be calibrated according to the procedures and at the frequency specified by the manufacturer. It will be operated according to the instructions provided by the manufacturer. Daily sensitivity checks will be conducted. The test will not be run with an instrument that is not functioning correctly.

3.6 TLV Sniff / Field (GMF-5-MOD)

This is another method used to determine the presence of volatile organic compounds dissipating from a waste. A reading of greater than 200 ppm on the instrument (FID, PID and or Catalytic Combustible gas and vapor sensing instrument or equivalent) requires that a flash point analysis be performed to test for ignitability if the material is destined for direct land disposal. A reading of < 500 ppm on the instrument (FID, PID and or Catalytic Combustible gas and vapor sensing instrument or equivalent) is required if the material is destined for storage or treatment in tanks.

Containers of waste are opened enough to insert the probe. The instrument pulls any vapors above the waste into the detectors. Sufficient time shall be allowed to clear the air from the sample line. The container is sampled immediately after opening. The probe inlet shall be placed close to, but not touching, the waste in the container. The result (POS/NEG) is documented in the logbook. Care shall be exercised to ensure that drafts are avoided in the area that is being sampled as this can cause a false negative result.

The instrument will be calibrated according to the procedures and at the frequency specified by the manufacturer. It will be operated according to the instructions provided by the manufacturer. Daily sensitivity checks and continuing sensitivity checks every twentieth sample will be conducted. The test will not be run with an instrument that is not functioning correctly.

HOC SCREEN (Lab Test with a. ECD or b. Electrometric Detection) (SK-22 a / b)

SCOPE

This method describes the preparation and analysis of samples for Halogenated Organic Compounds (HOCs) at the Grassy Mountain Landfill Facility. HOC listed compounds are specified in Appendix 3 of this WAP.

INTRODUCTION

GMF uses this method to screen wastes that will be land disposed for the presence of chemicals that may be incompatible with the landfill liner in organic halide concentrations above 1000 ppm or equivalent TCLP levels. It may also be used to determine total organic halide concentrations or equivalent TCLP halide concentrations.

SK-22a This method provides sample extraction and gas chromatographic conditions for the detection of halogenated organic compounds in waste samples. A 0.5 µl to 2 µl aliquot of the extract is injected into the gas chromatograph (GC) and compounds in the GC effluent are detected by an electron capture detector (ECD). A temperature program is used in the gas chromatograph to separate the HOC target compounds from the internal standard compound, decachlorobiphenyl (DCB).

SK-22b Alternatively, following the sample extraction (Steps 3.1 – 3.8 of SK-22a), the HOC screen may be conducted by converting the halogenated compounds in the extract to inorganic halide; the inorganic halide ions are extracted into an aqueous buffer solution; and the chloride content is measured using an ion specific chloride electrode. Conversion to inorganic halide, and measurement of chloride content is conducted using a Dextsil L2000 Analyzer (or equivalent) for chlorinated organics. Subsequent to extraction method SK-22b is based on EPA Method 9078.

Extraction is conducted using the same reagents and equipment for both methods SK-22a and SK-22b. Different matrix spike standards and calibration standards are used to suit the different instrumentation.

SK-22a APPARATUS AND MATERIALS

1.1 Gas chromatograph

- 1.1.1 Gas Chromatograph - Analytical system complete with gas chromatograph suitable for cool on-column or split-splitless injections and all required accessories (including detector, analytical columns, data collection and storage device, gases, syringes, etc.).
- 1.1.2 Column - capillary column, 25 or 30 meters in length (either 0.25 mm or 0.32 mm ID), DB-5 or DB-5MS (J&W Scientific or equivalent).
- 1.1.3 Detector - Electron capture detector (ECD).
- 1.2 Volumetric flasks - 2 ml, class A (Note: 3 ml, 4 ml, or 5 ml volumetric flasks may be used in place of the 2 ml flask, but the amount of internal standard added shall be adjusted to account for the increased extract volume).
- 1.3 Balance - Analytical, capable of weighing 0.01 g.
- 1.4 Syringe - 2.5 ml or 5 ml, gas tight.
- 1.5 Microsyringe - 250 µl or 500 µl, gas tight.
- 1.6 Glass scintillation vials - 20 ml, with Teflon or aluminum foil-lined screw-cap.
- 1.7 Spatula - stainless steel or Teflon coated.
- 1.8 Vials and caps - 2 ml for GC autosampler.
- 1.9 Disposable pipets - Pasteur.
- 1.10 Centrifuge - capable of spinning at 2000 rpm.
- 1.11 Dispenser, digital bottle top - Brinkmann Inc., Cat No. 50-03-530-1 or equivalent.

SK-22a REAGENTS

- 2.1 Internal standard solution - Decachlorobiphenyl at a nominal concentration of 100 mg/l in acetone.

2.2 HOC matrix spike standard - HOC standard in acetone at a total HOC concentration of 500 mg/l (this standard may also contain hexane and/or methanol as necessary to dissolve all of the selected HOC compounds). The HOC matrix spike standard should contain the same compounds used to prepare the calibration standards (step 2.3).

2.3 Calibration standards - HOC standards at a minimum of five concentration levels in isooctane (add acetone and/or methanol as necessary to dissolve all of the selected HOC compounds). One of the concentration levels shall be at a concentration near, but above the method detection limit. The remaining concentration levels define the working range of the GC. This standard contains from 10 to 15 HOC compounds including three or more compounds selected from the Volatiles list, four or more compounds from the Semivolatiles list, one or more compounds from the Organochlorine Pesticides list, and one or more PCB compounds as provided in Appendix 3. For example, the following compounds were used to prepare the calibration and matrix spike information provided in Tables 1 to 3:

- 2.3.1 Hexachloroethane,
- 2.3.2 Hexachlorobutadiene,
- 2.3.3 Hexachlorocyclopentadiene,
- 2.3.4 Hexachlorobenzene,
- 2.3.5 3,3' Dichlorobenzidine,
- 2.3.6 1,2 Dichloroethene
- 2.3.7 Bromodichloromethane,
- 2.3.8 1,2,3 Trichloropropane,
- 2.3.9 Aldrin,
- 2.3.10 Dieldrin,
- 2.3.11 Decachlorobiphenyl (internal standard).

2.4 Daily calibration check standard - Identical to the mid-level calibration standard (section 2.3 above). Prepare fresh calibration check standards every 14 days at a minimum. Maintain the calibration check standards in sealed vials at $4^{\circ} \pm 2^{\circ}$ C. Standards may equilibrate at room temperature (usually between 60° and 80°F) and be maintained in sealed autosampler vials at room temperature while the standard is being prepared, loaded or analyzed.

- 2.5 Tune standard - Pentachlorophenol at a nominal concentration of 5 mg/l in methanol.
- 2.6 Sodium sulfate - Anhydrous, granular.
- 2.7 Extraction Solvent #1 - 2,2,4-Trimethyl-pentane (isooctane, pesticide quality or equivalent)
- 2.8 Extraction Solvent #2 - Methanol (pesticide quality or equivalent).

SK-22a / b SAMPLE PREPARATION PROCEDURE

- 3.1 If TCLP has been approved for analytical comparison and the intent is to analyze a TCLP extract of the waste, use SW-846 Method 1311, section 7.2, to obtain that extract.
- 3.2 Place a 20 ml glass scintillation vial onto the balance and tare the balance to read 0.00 ± 0.05 grams.
- 3.3 Place approximately 1 gram of the waste or TCLP waste extract sample (Step 3.1) or blank matrix into the glass scintillation vial and record the sample weight to within 0.01 grams. A larger sample weight may be used provided the weight is accurately recorded. The sample matrix may be solid, liquid, solid/liquid, or sludge.
- 3.4 Add approximately 1-2 grams of anhydrous sodium sulfate to the glass scintillation vial. If the waste sample is primarily liquid, add additional sodium sulfate to produce a sludge or a sodium sulfate-sample slurry.
- 3.5 For the method blank and waste samples, add 10.0 ml of isooctane to the sample using a bottle top dispenser or another appropriate delivery device.
- 3.6 For matrix spike samples, add 1.0 ml of the HOC matrix spike standard followed by 9.0 ml of isooctane. Add the HOC matrix spike standard using a 2.5 ml or 5 ml syringe or bottle top dispenser and add the isooctane in a manner analogous to the solvent addition in section 3.4.

- 3.7 Cap the glass scintillation vial and vigorously shake the contents for 2 minutes. Use a robotic shaker (Wrist action shaker, Burrell Inc., Model 75 or equivalent device) or a vortex mixer to shake the vials. Indicate in the sample preparation log occurrences in which samples are mixed by hand, otherwise use the robotic shaker to perform this task.
- 3.8 Centrifuge the sample and the extract liquid in the glass scintillation vial at approximately 2000 RPM for 5-10 minutes.

SK-22a

- 3.8 Transfer 2.0 ml of the supernatant into a 2 ml volumetric flask, class A. Larger volumes may be used provided that the final volume is known and accurately recorded.
- 3.9 Using a 250 µl or 500 µl syringe or equivalent, add 100 µl of the internal standard solution (section 2.1) to the volumetric flask (the resulting volume is 2.1 ml). If an extract volume larger than 2 ml was used in step 3.8, increase the amount of internal standard accordingly (*i.e.*, add 50 µl of the internal standard solution for each 1 ml extract volume).
- 3.10 Cap the volumetric flask and mix the contents. Mixing is achieved by inverting the volumetric flask numerous times (*i.e.*, invert the volumetric flask 10 or more times to assure adequate mixing of the flask contents) or by using a high speed mechanical mixer (Vortex Genie 2, VWR Scientific, or equivalent). Documentation detailing the number of times in which each volumetric flask is inverted is not required.
- 3.11 Fill a 2 ml GC autosampler vial with the extract liquid and internal standard mixture and cap the vial. The sample extract may be stored in the sealed autosampler vial under refrigeration at $4^{\circ} \pm 2^{\circ} \text{C}$ for up to 14 days prior to GC analysis. Samples may equilibrate at room temperature (usually between 60° and 80 °F) and be maintained in sealed autosampler vials at room temperature while the sample is being prepared, loaded or analyzed.

Methanol Extraction: Wastes that are known (from generator knowledge or some other means) to contain halogenated phenols may be subjected to the methanol extraction (steps 3.12 through 3.19). Use this option as an additional analysis when requested by the facility manager or his/her designee (*e.g.*, laboratory manager,

group leader, etc.). If the additional analysis is not specifically requested, proceed to section 8 of this SOP.

- 3.12 Decant the remaining isooctane from each of the sample vial(s) into an appropriate waste container.
- 3.13 Add 10.0 ml of methanol to the same sample container(s), referred to in step 3.12, in a manner analogous to section 3.4.
- 3.14 Cap the glass scintillation vial and vigorously shake the contents for 2 minutes (see section 3.6 above).
- 3.15 Centrifuge the sample and the methanol extract liquid in the glass scintillation vial at approximately 2000 RPM for 5-10 minutes.
- 3.16 Transfer 5.0 ml of the supernatant into a 5 ml volumetric flask, class A. Extract volumes smaller than 5 ml may be used provided that the final volume is known and accurately recorded.
- 3.17 Using a 500 µl syringe or equivalent, add 250 µl of the internal standard solution (section 2.1) to the volumetric flask (the resulting volume is 5.25 ml). If an extract volume smaller than 5 ml was used in step 3.16, decrease the amount of internal standard accordingly (*i.e.*, add 50 µl of the internal standard solution for each 1 ml extract volume).
- 3.18 Cap the volumetric flask and mix the contents (see section 3.10 above).
- 3.19 Fill a 2 ml GC autosampler vial with the extract liquid and internal standard mixture and cap the vial. The sample extract may be stored in the sealed autosampler vial at 4 °C ± 2 °C for up to 14 days prior to GC analysis. Samples may equilibrate at room temperature (usually between 60° and 80 °F) and be maintained in sealed autosampler vials at room temperature while the sample is being prepared, loaded or analyzed.

SK-22a PROCEDURE AND CALCULATIONS

4.1 Gas chromatography operating conditions

- 4.1.1 Operate the GC in either splitless injection mode or cool on-column injection mode. See the Hewlett Packard GC reference manual for details. If the splitless mode is selected, install a clean injector port liner as recommended by the instrument manufacturer for splitless operation (Restek Corp., Cat No 20796 or equivalent). For cool on-column injections, a 0.53 mm ID guard column is recommended (Restek Corp., Cat No 10045 or equivalent).
- 4.1.2 Install a low-bleed injection port septum (Supelco, Inc., Cat No. 2-0654 or equivalent). Replace the septum whenever the conditions of section 9.1.2 are not obtained.
- 4.1.3 Carrier gas - Set the helium gas flow between 2 and 10 ml/min. Adjust the column flow so that DCB elutes within 25 minutes of injection.
- 4.1.4 Make-up gas - Set the nitrogen flow to 75 ± 25 ml/min.
- 4.1.5 If splitless injection is selected, set the injection port temperature at a constant temperature in the range of 200° and 250°C, inclusive. If cool on-column injection is selected, injection port temperatures may range from ambient to 280 °C, inclusive. Temperature programming of the cool on-column injection port allows the extract to be deposited onto the GC column at lower temperatures (less than 150 °C) and the final temperature may be ramped above 150 °C in order to drive the least volatile compounds out of the injection port area.
- 4.1.6 Detector - Set the detector temperature at a constant temperature of 280° \pm 30 °C. Calibration of the temperature monitoring thermocouple (or other similar device) is not a requirement of this procedure.
- 4.1.7 Program the oven temperature to hold at 100° C for 1 minute; then increase at a rate of 30° C/min to a final temperature of 280° C and hold for 8 minutes. Modifications to the oven temperature protocol are allowable in order to produce clear chromatographic resolution between the internal standard and

the HOC analytes, provided it is accurately documented. In addition, it may be necessary to sustain the oven temperature at 280 ° C longer than 8 minutes in order for all of the analytes to elute from the column prior to the next injection.

4.2 Calibration - Refer to SW-846 method 8000 for calibration techniques and response factor calculations.

4.2.1 Calibration must take place using the same sample introduction method (*e.g.*, oven temperature program, injection port temperature, detector temperature, GC column, *etc.*) used to analyze actual samples.

4.2.2 Each calibration standard shall contain an internal standard compound at a concentration that produces a signal near the mid-range for the ECD response. For example, a 1- μ l injection should produce a mid-range response at an internal standard concentration of about 5 mg/l (Note: instrument response may vary with time and between ECDs). Calculate the HOC response factor for each calibration standard as follows:

$$RF = (A_s C_{is}) / (A_{is} C_s)$$

where:

A_s = Total HOC area (excluding the area of the internal standard and isooctane blank).

A_{is} = Area of the internal standard.

C_{is} = Concentration of the internal standard, mg/l.

C_s = Total HOC concentration of the calibration standard, mg/l.

4.2.3 Calculate the mean response factor value, RF_x , as follows:

$$RF_x = \sum_n^i \frac{RF_i}{n}$$

where:

n = the number of calibration levels.

RF_i = the response factor for each calibration level.

4.3 Gas chromatographic analysis

4.3.1 For each day of analysis, inject blank isooctane to establish the instrument baseline and determine any column contamination that may interfere with HOC quantitation (inject blank methanol when the methanol extraction is used).

4.3.2 Inject the tune standard (section 2.5) and check the resulting area against historical results (two standard deviations below the average of pentachlorophenol areas). If the pentachlorophenol area value is less than this control limit value, perform column maintenance as needed to rejuvenate instrumental performance. For splitless injections, maintenance may include replacing the septum and/or GC insert liner and/or replacing the gold plated column seal and/or trimming 3 to 9 inches from the head of the analytical column (the end attached to the injection port during operation) and/or replacing the analytical column. For cool on-column injections, maintenance may include replacing the septum and/or guard column and/or trimming 3 to 9 inches from the head of the analytical column and/or replacing the analytical column.

4.3.3 Prior to the analysis of actual samples, verify the instrument calibration by injecting the mid-level calibration standard onto the GC. Calculate the response factor (RF_c) for the standard as outlined in step 4.2.2 above. If the RF_c value varies from the predicted response (RF_x) by more than $\pm 15\%$, perform maintenance as outlined above in section 4.3.1 and reinject the mid-level standard. If the RF_c value continues to exceed the $\pm 15\%$ criteria, prepare a fresh mid-level continuing calibration standard or new calibration curve.

4.3.4 The HOC concentration is calculated from the total area of all peaks excluding the internal standard area and any area associated with

background, the methanol blank, the isooctane blank or instrument noise. Determine the total HOC concentration in a sample as follows:

$$\text{Concentration (mg/kg)} = (A_s C_{is} D) / (A_{is} R F_x W_s)$$

Where:

D = Equivalent dilution volume, 10.5 ml, provided that no additional dilution was performed.

W_s = Weight of the composite sample, g.

A_s, C_{is}, A_{is}, and R F_x are defined above.

4.3.5 The total HOC concentration is the sum of the HOC concentration in the isooctane extract plus 1.25 times the HOC concentration in the methanol extract if the additional analysis option is used. Otherwise, the total HOC concentration is the HOC concentration in the isooctane extract. (Should there be a limit to the value of the interference that can be subtracted? egc

4.3.6 If the total HOC concentration for a sample is less than 1000 mg/kg and a response for a peak exceeds the detector quantitation limit, prepare a dilution of the sample extract with the appropriate solvent (either isooctane or methanol depending upon which extract liquid contained the truncated peak). Add additional DCB to the sample such that the final concentration of the internal standard is moderately consistent (*i.e.*, accurate sample concentrations are obtainable with the DCB concentration held between 2 mg/kg and 8 mg/kg) among all sample injections (see section 4.2.2 above).

4.3.7 If the total HOC concentration of the sample is less than 1000 mg/kg and exceeds the linear range of the system, dilute the sample as outlined above in section 4.3.6.

4.3.8 Any sample having a total HOC concentration equal to or more than 1000 mg/kg or equivalent TCLP value will be extracted and analyzed for the specific chemicals in Appendix 3 of the WAP, unless the Grassy Mountain Facility elects to treat the waste or reject it.

SK-22a QUALITY CONTROL

5.1 Before analyzing any samples, the criteria outlined in Step 7.4.3 of SW-846 method 8000 must be met. Failure to meet the criteria in section 5.1.1 of this SOP will require re-running the initial calibration, whereas failure to meet the criteria outlined in 5.1.2 may result in re-running the initial calibration or the preparation and injection of a fresh daily calibration standard.

5.1.1 Section 7.4.3.3 of method 8000 requires that the RF_x is constant ($< 20\%$ RSD) when comparing calibration factors.

5.1.2 Section 7.4.3.4 of method 8000 sets a limit of $\pm 15\%$ difference when comparing daily HOC response versus the initial HOC response (see section 4.3.2 of this SOP).

5.2 Analyze matrix spikes of samples at a minimum frequency of 10% (1 for every 10 samples). If the total HOC recovery fails the acceptance criteria, $X \pm 2s$ (where X is the average and s is the standard deviation of historical data), take corrective actions. Update control limits monthly at a minimum.

5.2.1 Corrective actions

5.2.1.1 Check the sample preparation records and associated calculations for errors.

5.2.1.2 If the unspiked sample contains HOCs, subtract the unspiked sample concentration from the HOC concentration detected in the spiked sample.

5.2.1.3 Analyze the daily calibration check standard to ensure that the GC/ECD is operating within normal parameters. If the response factor criteria are not met, take the corrective actions specified in section 4.3.2 and reanalyze the affected samples.

5.2.1.4 If none of the aforementioned actions lead to the elucidation of the problem, matrix interference forces are probable. If the results of

the MS AND MSD confirm each other matrix interference are confirmed. If they do not confirm, freshly prepare the samples and matrix spikes from the associated batch to confirm the presence of a matrix interferant.

5.3 Analyze duplicate matrix spike samples at a minimum frequency of 10% (1 for every 10 samples). If the % RPD fails the acceptance criteria, $X \pm 2s$ (where X is the average % RPD value and s is the standard deviation value of historical data), take corrective actions. Update control limits monthly at a minimum.

5.4 Analyze a method blank with each sample batch or 1 blank for every 10 unspiked samples. Add about 1 gram of blank sand to the scintillation vial and conduct the extraction process as outlined in section 3 above.

5.4.1 Method blank evaluation criteria - Section 2.3 of this SOP states that one of the calibration standards is at a concentration near, but above the method detection limit. If the total HOC area (A_s as defined in section 4.2.2 above) in the method blank does not exceed the total area in the least concentrated HOC calibration standard, the method blank contamination is acceptable.

SK-22a METHOD PERFORMANCE

6.1 In a single laboratory, the average recoveries and standard deviations presented in Table 1 were obtained using GC/ECD techniques. Three replicate samples were spiked near the total HOC concentration of 500 mg/kg. A wide variety of sample matrices were studied. One of the test samples was primarily liquid (Sump Solids), one of the matrices was an organic sludge (Refinery Waste) and one of the samples contained both solids and liquid (Plating Sludge) at a ratio of about 9:1 respectively. The other samples were solids of various origins. All extractions were performed on composite samples containing liquids and/or solids that were consistent with the total sample composition.

6.2 Detection Limits - the method detection limits vary with each individual Appendix 3 listed compound. The detection limit for each Appendix 3 listed analyte has not yet been established. However, the initial studies indicate that Aroclors (PCBs) and

other multi-component analytes may be detected at a concentration of 2 mg/kg while individual HOC compounds are usually observed at a concentration of 1 mg/kg.

- 6.3 The accuracy and precision of this method may be adversely influenced by the sample matrix. However, in a single laboratory, accuracy was determined within $\pm 15\%$ of the theoretical value (Table 1) and precision was found within $\pm 5\%$ (Table 3). Precision was determined by injecting a standard containing 25 mg/kg total HOC content. The standard was prepared in isooctane and contained each of the compounds listed in step 2.3 above at a concentration of 2.5 mg/kg each.
- 6.4 The data obtained during this study (Tables 1,2 and 3) were obtained using a calibration range that spanned from total HOC concentrations of 0.5 to 50 mg/kg, inclusive.

4 WASTE SAMPLING:

This section presents methods to be utilized to obtain samples of wastes as required by this WAP and applicable regulations. These methods shall apply to waste generated off-site as well as facility-generated waste. The specific sampling methods selected are dependent on both the nature of the waste and its location, and will be decided upon immediately before sampling.

4.1 Sampling Locations:

Samples, including incoming load samples, may be taken from a variety of locations throughout the facility or at an off-site location. Waste may be sampled from storage vessels, such as a tank, drum, roll-off box, rail gondola car, rail tank car, pin box, tanker or dump-type truck, etc. or from other locations including containment areas, process equipment, pipes and pumps.

4.2 Sampling Methods:

The methods and equipment used for sampling vary with the form and consistency of the waste to be sampled. They also vary depending upon the regulatory requirements for which the testing is done. Where samples are used to identify or confirm the identity of a waste, the appropriate representative sampling techniques, devices, and containers shall be selected from described in 40 CFR 261 Appendix I or equivalent. Where samples are used to determine compliance with treatment standards expressed in 40 CFR 268.40, after treatment, sampling techniques appropriate to the treatment standards will be used.

Sampling accuracy (the closeness of a sample value to its true value) and sampling precision (the closeness of repeated sample values) are the issues of importance. From both regulatory and scientific perspectives, the primary objectives of a sampling plan are to collect samples that allow accurate and precise measurements of the chemical properties of the waste. If the chemical measurements are sufficiently accurate and precise, they are considered reliable estimates of the chemical properties of the waste. Statistical techniques for obtaining accurate and precise samples are relatively simple and easy to implement. Sampling accuracy is usually achieved by some form of random sampling. In random sampling, every unit in the population has a theoretically equal chance of being sampled and measured. Consequently, statistics generated by the sample are unbiased (accurate) estimators of true population parameters. In other words, the sample is

representative of the population. Where particular types of sampling are indicated by the treatment standards, these will be used.

4.3 Traceability:

Sample traceability for all internal sampling and analysis and shipment of samples to suitable laboratories shall be followed. This involves the documentation of procedures so that a set of data can be traced back through the analyst, to the person performing the sampling, and then to the waste itself. All samples receive a unique sample identification number to facilitate this process. See the Quality Assurance Plan (Attachment II-WAP, Appendix 1) sections 5.2 & 5.4 for the requirements for seals and/or chain-of-custody.

4.4 Sampling Personnel:

Sampling shall be performed by trained personnel. The Facility Manager or designee shall train sampling personnel and periodically observe technique to ensure a thorough understanding of sample collection, storage, and transportation practices.

4.5 Sample Labels:

Sample labels are necessary to provide identification of samples. The labels shall be affixed to the containers prior to or at the time of sampling. The labels shall be filled out with the following information:

- sample identification
- place of collection
- date of collection
- person sampling
- manifest number & generator name or load number, etc., if applicable

4.6 Record (Log Book, Unload Work Order, or Equivalent):

All information pertinent to field surveys or sampling shall be recorded in a record. Since sampling situations vary widely, no set of rules can be given as to the extent of information that must be entered in the record. However, sufficient information shall be recorded to allow someone to reconstruct the sampling without reliance on the collector's memory. This record shall include at a minimum the following information:

- location of sampling point;
- volume of samples taken;
- date of collection;
- sample identification number;
- person sampling;
- comments or observations;
- sampling methodology
- copy of sampling results

4.7 Sample Preservation:

All samples shall be preserved in accordance with the parameter to be measured, as specified by the analytical method for that parameter. For sample preservation, specific procedures are found in the Quality Assurance Plan. Hazardous waste samples do not require preservation but are subject to holding times.

4.8 Sampling Small Containers:

The term "small container" refers to receptacles designed for transporting materials, e.g., drums and other small receptacles typically transported on flat beds or vans as opposed to bulk transport containers or stationary tanks. This section addresses sampling of small containers that are of a size that could be stored in the container storage building. COLIWASAs, tubes, shovels, drum thieves, and triers shall be the devices used to sample containers.

The following sampling criteria shall apply for shipments of a single waste stream from the same generator. 10% of the containers, rounding to the next whole number, will be sampled. Samples of containers with like physical appearance can be composited. Samples of unlike physical appearance may not. All containers in a waste stream, prior to being treated and/or disposed at GMF, will be opened to verify conformance to the physical appearance of those sampled. Additional samples will be taken from containers with non-conforming appearance.

Samples shall be taken from locations displaced both vertically and horizontally throughout the waste. For liquids (or liquids with precipitated solids), the sampling person shall use a COLIWASA or equivalent. The sampling device is inserted into the container from the top and is pushed down slowly until the bottom of the container is reached. The device is

sealed to retain the contents. The contents of the sampling device are then transferred to an appropriate sample container, which is labeled with waste identification information. The sampling device may also be stoppered at both ends, wiped dry with a disposable cloth, and then transferred to the lab for analysis.

A trier, thief, shovel, or scoop shall be used to sample containers that are solid in nature. The sampling person shall remove a sample that uniformly represents the waste composition of the container, i.e., all layers and phases shall be represented in the sample.

If the contents are solidified, such as concrete, clay, polymerized material, glue, only a sample from the top of the container is needed.

4.9 Sampling Liquid Tanks:

Typically liquid tanks are sampled from the outlet valve or piping. The valve shall be flushed prior to the sample actually being drawn. In addition, other methods for sampling tanks may be used such as a weighted bottle or bomb sampler in order to allow for sampling at various depths.

4.10 Sampling Bulk Materials:

Where sampling of bulk loads is required, each container of each load will be sampled as described below.

Bulk solids in rolloff boxes or dump trucks shall be sampled at two locations in the waste container. A trier, thief, auger or shovel shall be used in order to draw a sample from as deep a cross section as possible (at least one foot deep or the full depth of the waste which ever is less) at each location. The samples shall be composited together so that there is one sample which represents that particular bulk solids shipment.

Bulk solids in rail gondola cars shall be sampled at four locations in the waste container. A trier, thief, auger or shovel shall be used in order to draw a sample from as deep a cross section as possible (at least one foot deep or the full depth of the waste which ever is less) at each location. The samples shall be composited together so that there is one sample which represents that particular bulk solids shipment. This sample will be used for all rolloff boxes or dump trucks filled from that particular gondola car. No further incoming load sample is required for waste from that gondola car. However, each incoming load from that

car will be visually inspected to ensure visual conformance with the incoming load sample. A visual non-conformance will initiate actions to resolve the discrepancy.

Bulk liquids are sampled by using a COLIWASA or similar device which can sample vertical anomalies. Bulk sludges shall be sampled with a device appropriate for the consistency of the material. That may be a COLIWASA, trier, dip tube, or thief, etc. Each compartment of a tanker truck is sampled. Compartment samples from the same generator and waste stream may be composited prior to analysis only if there is no difference in physical appearance.

Tank trucks without man-ways shall be sampled through the valve. The valve shall be flushed prior to the sample actually being drawn.

An exception to the requirement for sampling each load of bulk load shipments will be where multiple bulk loads of a single waste stream are received from a single source (e.g., a major site clean-up of contaminated material or a large volume generator shipping over a short time period). In such cases, all loads will still be inspected for physical appearance. A visual non-conformance will initiate actions to resolve the discrepancy. At least ten percent of such loads, minimum one load per day, will be sampled and analyzed for the incoming load parameters.

4.11 Frozen Waste:

Loads may arrive at temperatures which prevent a representative sample from being obtained. Under such circumstances, the wastes will be allowed to warm until such time as sampling can be performed. Sampling can occur at any temperature provided a representative sample can be obtained. A sample will then be taken and analyzed.

4.12 Other Samples (i.e., process equipment, containment, sumps, etc.):

The sampling method for waste in and from process equipment (i.e., stabilization tanks), containment and containment sumps, put-piles, etc., will vary with the nature of the waste material but will normally be grab samples as these are typically homogeneous wastes. For grab samples the sampling device of choice shall be a scoop, shovel, bottle, cup or similar device with a container in which to deposit and transport the sample. A dip tube or COLIWASA may also be used to sample sumps.

4.12.1 Post Treatment Sampling of Waste Treated in Stabilization Tanks

When waste is treated in the stabilization tanks it is mixed with reagents. Typically a homogeneous mixture is obtained at the end of treatment. Thus it is reasonable to approach the pile as a mass with no vertical or horizontal stratification. EPA has promulgated compliance of concentration based treatment standards for all non-wastewaters based on grab samples as stated in 40CFR 268.40 (b). GMF follows this sampling methodology for waste treated at GMF. Any grab sample must pass the treatment standards in order for compliance to be assured. When there is any uncertainty in achievement of treatment standards, GMF will follow the procedures for re-sampling in 4.12.1.2.

4.12.1.1 Initial Sampling

One grab sample from each batch of treated waste shall be taken. It can be taken from the tank after treatment is completed, during removal from the tank, from the transport vehicle used to move the waste to the staged “put-pile” location, or immediately after the “put-pile” is placed.

4.12.1.2 Re-Sampling

Wastes treated in the stabilization tanks and staged as “put-piles” to await analytical results, may need resampling for confirmatory (verification) analyses. Resamples will consist of two grab samples per batch of material placed in the put-pile. If results from the initial sample indicate a failure to meet LDR treatment standards, two resamples shall either be taken to verify the results of the initial sample or the waste shall be retreated. If one or both resamples fail, the waste must be retreated. If both pass, the waste meets treatment standards and may be released for disposal.

4.12.2 Surface Impoundment

4.12.2.1 Water

The representativeness of the samples of the waste in a surface impoundment is dependent on the number of samples collected over the volume of the waste in the impoundment. If the waste stored in the impoundment is a homogeneous mixture (e.g. non-hazardous and/or F039 liquids), the sampling approach will be that of a non-stratified, free-flowing liquid. At a minimum at least three samples are collected, one each from near the bottom and at least two sides of the impoundment. These samples

are composited. unless stratification is observed and if present, discrete aliquots shall be taken as grab samples.

4.12.2.2 Sludge on the Bottom

The representativeness of the samples of the sludge at the bottom of the surface impoundment is dependent on the number of samples collected over the volume of the waste in the impoundment.

If there is minimal sludge buildup on the bottom of the impoundment, it will be difficult to get a sample. Under such circumstances, four grab samples taken from the bottom on each side of the impoundment shall be taken and composited together.

If the buildup is three inches or more, at least four samples shall be taken from the thickest layers of sludge at random locations.

4.12.3 Leachate from RCRA Leachate Collection Systems:

GMF claims exemption to the air emission standards under Subpart CC in accordance with 40 CFR 264.1082– The following procedure shall be used to verify the applicability of the exemption. It will also be used to collect HOC samples for analysis.

4.12.3.1 Frequency: The leachate from each cell will be analyzed annually to confirm that the VO concentration in the leachate is < 500 ppm and to determine the HOC concentration of the leachate.

4.12.3.2 Collection and Sampling of Leachate from Each Individual RCRA Cell:

4.12.3.2.1 Pump for 10 minutes from each leachate sump (all risers) in a given RCRA cell into the portable leachate collection tank.

4.12.3.2.2 Obtain a sample from the portable leachate collection tank using a collowasa and under chain-of-custody, send the sample to a laboratory for Analysis.

4.12.3.3 Analysis: the waste shall be analyzed in accordance with 40 CFR 265.1084 (a)(3)(iii).

4.12.4 Water from Wheel Wash Collection Tanks:

GMF claims exemption to the air emission standards under Subpart CC in accordance with

40 CFR 264.1082– The following procedure is used to verify the applicability of the exemption.

- 4.12.4.1 Frequency:** Water from the wheel wash tank(s) will be analyzed annually to confirm that the VO concentration in the water is < 500 ppm.
- 4.12.4.2 Collection and Sampling of Wheel Wash Water:** Prior to emptying the Wheel Wash Tank(s), a sample is collected and under chain-of-custody, sent the sample to a laboratory for Analysis.
- 4.12.4.3 Analysis:** the waste shall be analyzed in accordance with 40 CFR 265.1084 (a)(3)(iii).

5 PRE-TREATMENT PROCEDURES:

Section 2 discussed the procedures for waste to be stored at the facility. Upon acceptance the waste is placed into storage. The wastes may be processed (i.e., decanted, disassembled, crushed, etc.) or commingled with other wastes prior to treatment or off-site shipment. Each movement of a waste within the facility, during which any change in its characteristics may occur, makes the waste subject to additional inspection, sampling, and analysis to determine the appropriate handling and management of the waste. All of the analyses needed for the storage functions shall be performed during incoming load verification. These are not repeated unless it is known or believed that the waste characteristics may change during storage or processing. This section describes the methods for determining the pre-treatment parameters (Table C-2), if required.

The profile analysis and/or annual verification sample analysis, or for debris or other waste that is not amenable to sampling, generator / GMF knowledge, may be used in lieu of a sample of the waste to be treated to determine the constituents in the waste prior to treatment. This information is needed to develop the appropriate treatment recipe. The analyses shall be performed on homogeneous blends of wastes, representative composite samples, or on individual batches.

5.1 Visual Inspection:

All containers at the Container Management Building will be inspected for the presence of free liquids prior to being sent for landfill with the exception of:

- lab packs;

- items not requiring incoming load sampling.

A waste stream would be considered without free liquids if the pre-acceptance description was non-liquid and if the incoming load inspection confirmed this description.

All storage containers (e.g., shipping containers, overpack containers, etc.) that do not meet one of the conditions above and which contain free liquids will either be solidified or decanted to remove the free liquids.

5.2 Wastes that do not Require Samples

The chemical characteristics (those specified on Table C-2) of these waste types will be determined from the description of the material, container inventory sheets, generating process, generator knowledge, literature searches, and/or good judgement rather than from analysis of a sample. The method for determining these parameters will be clearly documented in the operating record.

6 TREATMENT PROCESSES

If the treated waste contains wastes with different treatment standards for a constituent of concern, then the Permittee shall treat the waste to an extent that the most stringent regulatory or statutory treatment standard for the constituent of concern is met.

6.1 Solidification

In this process, waste containing free liquids will be mixed with pozzolanic and other appropriate material to assure all free liquids are chemically fixed. This process could also be used to neutralize a waste stream and meet the LDR Technology Standard of "NEUTR"

Pre-treatment analyses ensure the wastes are compatible with the pozzolanic reactant. In-process analyses are not required for this treatment. Post-treatment analyses shall be required to assure that all free liquids have been chemically reacted and the mixture is suitable for final handling or processing. The Paint Filter Test shall be performed in order to monitor this process.

6.2 Stabilization / Oxidation / Reduction, Etc.

6.2.1 Process Descriptions

A variety of techniques are used by GMF to treat waste to meet LDR numeric and/or technology standards prior to land disposal. These include pH adjustment and buffering, oxidation, reduction, conversion to insoluble salts, and chemically bonding elements to an insoluble matrix.. Technology standards that GMF achieves through this process are:

- Chemically "fixing" (i.e. reducing the leachability) inorganic metal component(s) in a given waste (LDR Technology Standard of STABL). This is done by converting the more soluble metal compounds to less soluble compounds and/or combining the metal compounds with reagents which physically bind them. Depending upon the waste stream and its constituents oxidation and/or reduction reactions may be required to achieve the desired results.
- Oxidizing and/or reducing a waste stream may be required to reduce total and/or amenable cyanides or sulfides in a waste to below LDR concentration standards.
- Oxidizing a waste stream to achieve the LDR treatment technology standard of "CHOXD" and/or "DEACT"
- Reducing a waste stream to achieve the LDR treatment technology standard of "CHRED".
- Neutralization: This process could also be used to neutralize a waste stream and meet the LDR Technology Standard of "NEUTR"
- This process may also be used to treat hazardous debris with either immobilization technology listed in 40 CFR 268.45.
- Physical sizing of waste, as necessary, is allowed to facilitate stabilization treatment.

The following text outlines the approach that GMF will adhere to when treating wastes to meet LDR standards:

6.2.2 Frequency and Scope of Testing

The Permittee shall use either Option A, Option B or Option C when treating LDR wastes with numeric LDR standards that are destined for Land Disposal:

6.2.2.1 OPTION A

A suitable laboratory shall analytically test each treated waste batch, selected for this option, or laboratories using applicable test method(s). The resulting analytical

data shall demonstrate that the treated wastes meet all applicable treatment standards specified in 40 CFR 268.41, 268.43, 268.48 and/or 268.49 prior to Land Disposal of such wastes.

6.2.2.2 OPTION B

Treatment "recipes" that establish a ratio between the waste and each material or reagent that is to be used during the treatment of the LDR waste(s) shall be developed if Option B is used. These "recipes" shall be recorded in the operating record of the facility. All wastes treated on-site under this option shall be treated using the appropriate "recipe". Tier testing shall be used as an expression of the statistical confidence of the application of a particular treatment recipe to a particular waste stream. The waste stream must be consistent in its chemical and physical properties, and the treatment recipe must be uniformly effective for this option to be used.

Minor changes to the established recipe include allowances for moisture/liquid content of the waste or quantities of the treatment reagents used. These shall be within a 25% quantity variance. The exception to this is Cement Kiln Dust, which varies significantly in regards to its effectiveness. All other reagents must be within 25 percent of the established recipe.

If there is a failure in meeting the treatment standards at any time, Grassy Mountain will return to Tier 1, if on Tier 2 Treatment Verification, or Tier 3a Treatment Verification if on Tier 3 Treatment Verification, on the next load of the same waste stream that arrives at the facility, following documenting the failure to meet the standards. Waste that has been land disposed is not affected by returning to Tier 1 or Tier 3a.

The following procedure and testing frequency shall be followed:

6.2.2.2.1 TIER 1 Treatment Verification

Each batch of a treatment waste stream treated with the same recipe shall be analytically tested using applicable test method(s). The resulting analytical data must demonstrate that the treated wastes meet all applicable treatment standards specified in 40 CFR 268.41, 268.43, 268.48 and/or 268.49, prior to land disposal of such waste. If the test results from the treatment of nine successive "same waste"

batches demonstrates that all nine batches of treated waste meets treatment standards, the Permittee is allowed to advance to Tier 2 and test one of every five batches of the "same waste". The Permittee cannot proceed to Tier 2 until the analytical results of all nine batches are verified and determined to have met the LDR standards. Loads of the same waste stream that arrive at the facility, while waiting for the analytical results from the ninth load to be verified, will be subject to Tier 1 treatment verification.

If the Permittee has verified 20 consecutive batches of the same waste stream that has been treated with the same recipe, Tier 2 can be omitted, allowing the Permittee to go directly to Tier 3.

6.2.2.2.2 TIER 2 Treatment Verification

Tier 2 begins with the 10th load, which is sampled. If the next four batches of the same waste treatment stream are treated with the same recipe, they can be land disposed without testing. The 15th batch shall be sampled and analytically tested using applicable test method(s). The resulting analytical data from this batch must demonstrate that the treated wastes meet all applicable treatment standards of 40 CFR 268, prior to land disposal. The next four batches of the same waste treatment stream that are treated with the same recipe, can be land disposed without further testing. Grassy Mountain then has the option to proceed to Tier 3. The Permittee cannot proceed to Tier 3 until the analytical results of the 15th batch are verified and determined to have met the LDR standards. Loads of the same waste stream that arrive at the facility, while waiting for the analytical results from the 15th load to be verified, will be subject to Tier 2 treatment verification.

If the analytical results indicate that any load tested during Tier 2 Treatment Verification failed to meet the standards, the Permittee must resume Tier 1 Testing, starting at sample one as indicated on Table C-6.

6.2.2.2.3 Tier 3 Treatment Verification

Tier 3 begins with the 20th batch being sampled and analytically tested. If the next nine batches of the same waste treatment stream are treated with the same recipe, they can be land disposed without testing. The 30th batch shall be analytically tested using applicable test method(s). The resulting analytical data from this batch must demonstrate that the treated wastes meet all applicable treatment standards of 40 CFR 268, prior to land disposal. The next nine batches of the same waste

treatment stream that are treated with the same recipe, can be land disposed without further testing.

If the analytical results indicate that any load tested during Tier 3 testing failed to meet the standards, the Permittee must, at a minimum proceed to Tier 3a Treatment Verification on the next load of the same waste stream that arrives at the facility. The facility has the option to return to Tier 1 Treatment Verification procedures in the event of a failure during Tier 3 Treatment Verification.

Tier 3a Treatment Verification

Tier 3a Treatment Verification is an option if a sample tested and analyzed during Tier 3 Treatment Verification fails to meet the standards. Tier 3a requires that five consecutive samples be obtained and analyzed. If all five samples consecutive samples meet the treatment standards identified in 40CFR268, the Permittee may return to Tier 3 treatment Verification.

6.2.2.2.4 TIER 4 Treatment Verification

If a uniform and homogeneous waste treatment stream can be demonstrated as receiving adequate treatment from an established recipe on a consistent basis, a Class 1 with prior approval permit modification may be requested of the Executive Secretary to further reduce the post treatment verification analysis beyond that of Tier 3. A combination of laboratory post treatment analysis and batch testing can be utilized to demonstrate consistency and uniformity to satisfy this request. Typically, a Tier 4 request will allow a reduction to one batch in every 20, although further reductions may be considered and approved by the Executive Secretary.

Tier Testing Block Flow Diagram

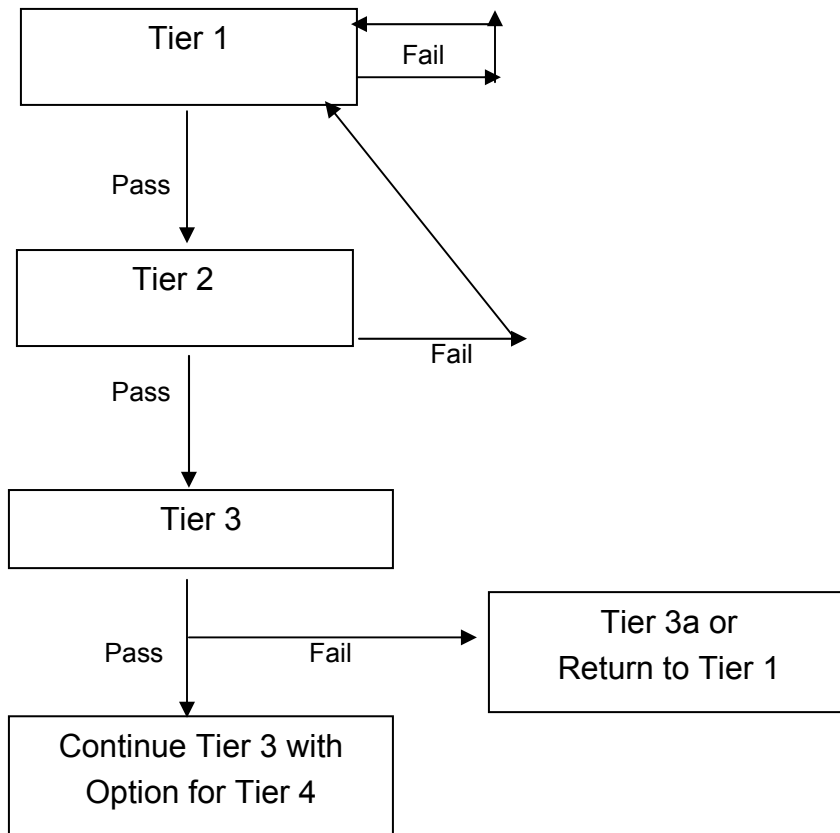


TABLE C-5: Tier Testing Sampling Frequency

| Tier No. | Batch No. | Testing? Y/N | |
|----------|-----------|--------------|--|
| | | | |
| 1 | 1 | Y | |
| | 2 | Y | |
| | 3 | Y | |
| | 4 | Y | |
| | 5 | Y | |
| | 6 | Y | |
| | 7 | Y | |
| | 8 | Y | |
| | 9 | Y | |
| 2 | 10 | Y | |
| | 11 | N | |
| | 12 | N | |
| | 13 | N | |
| | 14 | N | |
| | 15 | Y | |
| | 16 | N | |
| | 17 | N | |
| | 18 | N | |
| | 19 | N | |
| 3 | 20 | Y | |
| | 21 | N | |
| | 22 | N | |
| | 23 | N | |
| | 24 | N | |
| | 25 | N | |
| | 26 | N | |
| | 27 | N | |
| | 28 | N | |
| | 29 | N | |
| | 30 | Y | |
| | 31-39 | N | |
| | 40 | Y | |
| | 41-49 | N | |

6.2.2.3 Option C

If a total analysis of the waste demonstrates that individual analytes are not present in the waste, or that they are present but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run. However, the Permittee will provide the total waste analysis and justification of its decision not to run the TCLP in the Operating Record.

When a liquid or solid waste stream at the point of generation is above the applicable TCLP treatment standards specified in 40 CFR 268.41, 268.43, 268.48 and/or 268.49 prior to treatment at Grassy Mountain, but would meet these TCLP treatment standards following the 20:1 dilution that is specified in TCLP Method 1311 , Option C may be used.

Initially, prior to solidification and land disposal a raw waste sample of the waste stream shall be analyzed for total concentration of each applicable parameter. The maximum leaching potential (MLP) will be calculated from the analytical result, as if the material were 100% solid. If the MLP of the applicable parameters meet the associated treatment standards, then that load and all subsequent loads for that waste stream can be directly land disposed following solidification and passing PFLT.

Waste streams that meet applicable treatment standards by calculation of the MLP, will subsequently be re-verified annually and/or whenever there is reason to believe the waste stream has changed, such as the addition of one or more applicable elements, or a process change at the point of generation, which might cause the concentration of target parameters to become elevated.

If an element's MLP exceeds applicable treatment standards, Grassy Mountain shall revert to Option A or Option B.

6.3 Hazardous Debris

GMF can utilize the following Alternative Treatment Standards for Hazardous Debris (40 CFR 268.45)

- Any of the “Physical Extraction Technologies” Table I, A.1.a., b., c., d., and/or e. The procedure for documenting the results of utilizing these standards will be available upon request.

- Any of the “Immobilization Technologies” Table I, C.1., 2., and/or 3.
- Any self-implementing treatment authorized in 40 CFR 761.79, Decontamination Standards and Procedures, may be used to decontaminate, for PCBs, RCRA wastes and/or materials containing PCBs.

6.4 Carbon Adsorption

Carbon adsorption can be used to decontaminate for PCBs from RCRA regulated liquid wastes and other liquids containing PCBs in accordance with 40 CFR 761.79. Solidification

7 RECORD KEEPING FOR WASTE CODES

When waste is profiled to be stored and/or treated at GMF, the waste codes shall be reviewed to determine the applicability of storing, treating and/or disposing of that waste at GMF. When waste arrives at GMF waste codes assigned to the waste via manifest and LDR forms shall be compared with those on the profile to ensure that the codes and LDR standards that have not been met and are associated with the shipment continue to be those that the facility can manage.

Most waste at GMF is contained and managed in discrete containers prior to disposal and much of it meets treatment standards prior to being received. Beyond profiling and receiving procedures, tracking codes of waste already meeting treatment standards is not necessary. If, however, the waste needs to be treated prior to disposal, GMF shall track codes in the treatment vessels to ensure that all standards are being met.

7.1 Waste Code Record Keeping for Storage and/or Treatment Vessels:

There are two cumulative storage and/or treatment units that require tracking of waste codes. These are:

- Site waste water storage tanks; and
- Stabilization Tanks.

7.1.1 Wheel Wash Collection Tank

The wheel wash collection tank contains the runoff water from washing trucks after they have exited the landfill. This water may be solidified and landfilled or sent to Aragonite for incineration.

7.1.2 Site Water Storage Tanks

These tanks normally only store leachate from the RCRA landfills. Other site water from sumps and containment and groundwater monitoring activities shall be collected solidified and placed into a RCRA landfills or sent to Aragonite for incineration. Other < 500 ppmw VOC water could be stored in these tanks with waste codes other than that for leachate. If that occurred, this section for waste code tracking shall be implemented for those tanks.

7.1.3 Stabilization Tanks

These tanks shall be used only for treating wastes. Each waste may carry different waste codes. Each time the tank is emptied (all material is removed that can be removed with the trackhoe or equivalent) all RCRA or State waste codes shall be considered to be removed.

Thus no waste code tracking is required unless more than one waste, with different waste codes, are being treated at the same time.

If the facility accepts and treats TSCA/RCRA waste, the tanks in which treatment occurred are emptied by meeting the definition of empty for RCRA purposes and by triple-rinsing with a suitable solvent for TSCA purposes. The third and final rinseate shall be tested and confirmed to be < 2 ppm to be considered clean for TSCA purposes. Alternatively, the surfaces may be wipe sampled and confirmed to be < 10 ug/100 cm² to be considered clean.

7.1.4 Storage/Treatment Vessel Waste Code Tracking Procedure

Specific record keeping requirements shall be necessary for cumulative vessels to account for the wastes remaining when the vessel is refilled with wastes carrying additional waste codes. Waste codes shall be tracked in cumulative vessels by the following procedure.

7.1.4.1 7.1.4.1 Waste Code Tracking / Removal Procedure for Cumulative Tanks

When a new batch of compatible waste is added to the tank, the waste codes associated with this new waste shall be added to those waste codes already associated with tank. The tank will accumulate waste codes until the codes are removed (the vessel is emptied) or all waste codes that the facility can accept for disposal are associated with that vessel. When the vessel is emptied, no waste codes remain in that vessel.

If batches with different waste codes are mixed, the LDR standards for all the waste codes in the batch shall be met prior to disposal.

If the vessel is used for TSCA/RCRA waste, the vessels accumulate the TSCA code by contact until emptied by the RCRA definition by triple-rinsing with a suitable solvent for TSCA purposes. The third and final rinseate shall be tested and confirmed to be < 2 ppm to be considered clean for TSCA purposes. Alternatively, the surfaces may be wipe sampled and confirmed to be < 10 ug/100 cm² to be considered clean.

8 ANALYSIS OF TREATED WASTE:

A suitable laboratory according to this Waste Analysis Plan shall perform the analysis of the treated wastes. The treated wastes shall be tested for all LDR constituents with numeric standards and UHCs as appropriate for the waste codes in the waste that did not meet treatment standards prior to treatment.

9 FATE OF TREATED WASTES:

Treated wastes can be temporarily (six months or less) "put" onto a liner or in a container (put-pile) within a hazardous waste landfill cell while awaiting laboratory (verification) analyses. The liner must be visible on all sides of the waste so as to prevent commingling with the waste in the landfill and other put-piles. Such wastes shall be labeled with a tracking number and located in such a manner that allows complete retrieval of the waste should the waste analyses subsequently determine that the waste does not meet the treatment standards of R315-13-1. Wastes making up a put-pile shall be disposed within one year of receipt at GMF and no more than 250 put-piles can be in existence at one time.

Appendix 1 - Quality Assurance Plan FOR Clean Harbors Grassy Mountain, LLC.

INDUSTRIAL AND HAZARDOUS WASTE FACILITY

(Modifications to this QAP are considered to be a class 1 modification to the permit and may be made without prior approval of the Executive Secretary if the changes are necessary to stay current with the most recent SW-846 methods or comply with Utah BLI requirements. A copy of the modified QAP will be provided to the Executive Secretary within seven days of making the changes.)

LABORATORY / TECHNICAL MANAGER

DATE

QAP TABLE OF CONTENTS

| SECTION | PAGE |
|--|------|
| 1.0 QAP DESCRIPTION | 1 |
| 1.1 Purpose | 1 |
| 1.2 Scope | 2 |
| 1.3 Objective | 2 |
| 2.0 PROJECT ORGANIZATION AND RESPONSIBILITY | 2 |
| 2.1 Quality Control Manager | 2 |
| 2.2 Laboratory Manager | 2 |
| 2.3 Laboratory Supervisor | 3 |
| 2.4 Chemists | 3 |
| 2.5 Laboratory Technicians | 3 |
| 2.6 Sampling Technicians | 3 |
| 3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT IN TERMS OF PRECISION, ACCURACY, COMPLETENESS, AND COMPARABILITY | 5 |
| 3.1 Accuracy | 5 |
| 3.2 Precision | 6 |
| 3.3 Method Preparation Checks | 7 |
| 3.4 Completeness | 7 |
| 4.0 SAMPLING PROCEDURES | 18 |
| 4.1 Sample Collection | 18 |
| 4.2 Sampling Containers | 20 |
| 4.3 Sampling Tanks | 20 |
| 4.4 Sampling Bulk Waste | 20 |
| 4.5 Sampling Surfaces | 20 |
| 4.6 Frozen Waste | 20 |
| 4.7 Other Samples, i.e. Process Equipment, Containment, Sump, etc. | 20 |
| 5.0 TRACEABILITY | 21 |
| 5.1 Sample Labels | 21 |
| 5.2 Sample Seals | 21 |
| 5.3 Sampling Logbook | 21 |
| 5.4 Chain of Custody | 23 |
| 6.0 CALIBRATION PROCEDURES AND FREQUENCIES | 23 |
| 7.0 ANALYTICAL METHODS | 25 |
| 8.0 DATA REDUCTION, VALIDATION, AND REPORTING | 26 |
| 8.1 Data Reduction | 28 |
| 8.2 Data Validation | 28 |
| 8.3 Data Reporting | 28 |
| 9.0 INTERNAL QUALITY CONTROL CHECKS | 29 |

| | | |
|------|--|----|
| 9.1 | Field Quality Control | 29 |
| 9.2 | Analytical Quality Control | 30 |
| 9.3 | Specific Requirements for Inorganic Analysis | 30 |
| 9.4 | Specific Requirements for Organic Analysis | 30 |
| 10.0 | PROFICIENCY TESTING AND SYSTEM AUDITS | 31 |
| 10.1 | Internal and External Proficiency Testing | 31 |
| 10.2 | Internal System Audits | 33 |
| 11.0 | PREVENTATIVE MAINTENANCE | 33 |
| 12.0 | CORRECTIVE ACTION | 35 |
| 13.0 | QUALITY ASSURANCE REPORTS TO MANAGEMENT | 35 |

FIGURES AND TABLES

| | | |
|------|---|----|
| 2.1 | LABORATORY ORGANIZATION | 4 |
| 3.1 | PRECISION, ACCURACY, METHOD PREPARATION: OBJECTIVES AND LIMITS | 8 |
| 4.1 | SAMPLING CONTAINERS, PRESERVATION AND HOLDING TIMES | 19 |
| 6.1 | CALIBRATION PROCEDURES AND FREQUENCIES | 24 |
| 8.1 | DATA REPORTING SCHEME | 27 |
| 11.1 | MAINTENANCE SCHEDULE | 34 |

1.0 QAP DESCRIPTION

This manual is the written document that identifies the policies, organizational objectives, functional objectives, and specific quality activities designed to achieve the quality goals desired for operation of the laboratory. This manual describes, in a reasonably systematic way, the measures the laboratory employs to implement the quality assurance program. It is intended to be flexible and adaptable to changes in the methods, techniques, and personnel.

Data of unknown quality is useless. It is this premise which management bases its stance on quality control.

Data of good quality does not just happen. Quality control must be an integral part of day to day operations. It relies on each individual within the program to make data quality his/her primary objective.

The goal is to produce high quality data so that good decision making can occur. This Quality Assurance Plan is designed to ensure that all data generated are complete, precise, and accurate. Data quality will be documented.

There are three (3) primary areas where data quality is of concern. These are as follows:

- Waste Approval
- Waste Acceptance
- Treatment Residue Monitoring

The objective of the first area is to examine the chemical and physical properties of a particular waste stream and determine if the facility is capable of accepting the material under its permit conditions.

The second area is a quality control check to determine that the waste being accepted at the facility is indeed the same waste, which was previously approved. A waste's compatibility with other wastes already being stored at the facility is also assessed.

The last area concerns demonstrating that wastes treated at the facility meet the requirements of the Land Disposal Restrictions prior to land disposal.

This plan does not affect analyses that may be performed to assist in determining treatment recipes.

1.1 PURPOSE

The purposes of this Quality Assurance Plan is to ensure that all information, data, and resulting decisions compiled under a specific task are technically sound, statistically valid, properly documented and are adequate to meet the requirements for which they are performed.

Quality Assurance is the program or structure within an organization that plans, designs, and monitors the QA procedures and affirms the data quality in reports.

Quality Control is the mechanism or activities through which Quality Assurance achieves its goals. This is accomplished through a program, which defines the frequency and methods of checks, audits, and reviews necessary to identify problems and dictate corrective action.

1.2 SCOPE

The Quality Assurance Plan encompasses the entire measurement system from initial sampling to the final reporting and interpretation of results. This QAP is for the GMF laboratory. Data generated by Suitable Laboratories for GMF must meet the requirements of this QAP.

1.3 OBJECTIVE

This Quality Assurance Plan is designed to produce accurate and reliable data. In order to accomplish this objective, the following criteria must be achieved:

- All procedures and practices shall be accepted by the client and/or regulatory agency.
- A continuing program shall be developed to monitor the performance of the program.
- A mechanism shall be developed for correcting problems, which are determined by the monitoring assessment.

2.0 LABORATORY ORGANIZATION AND RESPONSIBILITY

The organizational structure of the laboratory is shown in Figure 2.1.

The initial step in any Quality Assurance Plan begins with the people involved. In addition to the organizational chart, descriptions of those individuals involved in Quality Assurance and their responsibilities are included.

2.1 QUALITY CONTROL MANAGER

The Quality Control Manager is responsible for identifying quality problems, to recommend and provide solutions, and to verify the implementation of the solutions. The duties include:

- developing mechanisms to carry out QA/QC objectives;
- administration of quality control procedures;
- implementation of corrective action(s); and
- maintenance of QA/QC records.

2.2 LABORATORY MANAGER

The Laboratory Manager is responsible for the daily operation and management of the laboratory. The manager's duties include:

- management of laboratory personnel;
- oversee and coordinate instrument and equipment maintenance;
- review of work procedures and daily laboratory practices;
- work scheduling;
- record keeping;
- training of laboratory personnel; and
- responsible for the administration of Quality Control at his/her respective laboratory.

2.3 LABORATORY SUPERVISOR

The Laboratory Supervisor supervises the daily operation and management of the laboratory. The supervisor's duties include:

- management of chemists and technicians;
- oversee and coordinate instrument and equipment maintenance;
- review of work procedures and daily laboratory practices;

- work scheduling;
- record keeping;
- training of laboratory personnel; and
- responsible for the administration of quality control at his/her respective laboratory.

2.4 CHEMIST

The Chemist's duties as they relate to QA/QC are as follows:

- recommendations for technical decisions;
- evaluating and reviewing test procedures;
- reviewing and signing laboratory reports;
- ensuring that results are accurate and reproducible;
- calculations and interpretations of test results;
- equipment and instrument calibration and operation; and
- sample preparation and analysis.

2.5 LABORATORY TECHNICIANS

The laboratory technicians duties as they relate to QA/QC are as follows:

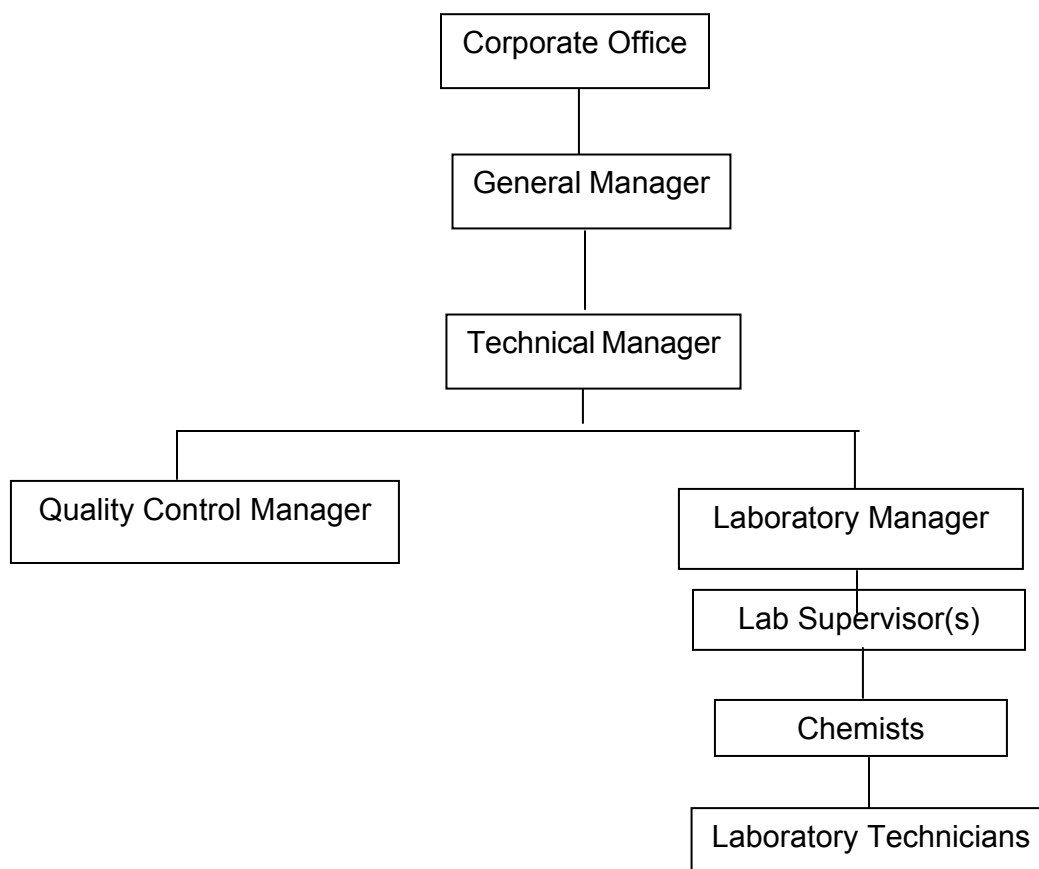
- performing sample preparations and analysis;
- maintaining a clean and safe working environment;
- making recommendations to supervisors regarding analysis or QA/QC performances;
- performing QA/QC analysis; and
- reviewing and signing laboratory reports.

2.6 SAMPLING TECHNICIANS

Sampling technicians are specially trained personnel responsible for sampling containers, vessels, tanks, and process streams. These people may be chemists, engineers, laboratory technicians, or operations personnel. They all have specialized training in sampling QA/QC techniques including the use of various sampling apparatus, sample site selection, sampling methodologies, and chain of custody procedures.

The Facility Manager or designee interacts with the sampling technicians to assure understanding of selection, collection, storage, transportation, and documentation practices.

Figure 2.1



Note: The facility may use personnel from another facility to fulfill any of the positions listed above. For example, the Technical Manager, Lab Manager and Quality Control Manager may be Clean Harbors from other location employees while functioning in these same capacities for Grassy Mountain. Depending upon the operations being performed at the facility, only the General Manager, Lab Manager and QC positions must be filled to maintain an operating laboratory. For a functioning laboratory, the person performing the Laboratory Supervisor function, must be stationed at the facility.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT IN TERMS PRECISION, ACCURACY, COMPLETENESS, AND COMPARABILITY.

Data Quality objectives are defined as follows:

- Precision - is the measure of agreement of a set of replicate results among themselves. Precision is assessed by means of duplicate/replicate sample analysis.
- Accuracy - is the nearness of a result or the mean (X) of a set of results to the true value or an established laboratory mean. Accuracy is assessed by means of reference samples and percent recoveries.
- Completeness - is the measure of the amount of valid data derived from a system of measurement as compared to the amount of data which was expected to be obtained.

3.1 ACCURACY

Using one or more of the following techniques generates accuracy information for quantitative measurements:

Calibration Checks

Calibration checks determine the acceptability of a calibration. The limits are method specified.

Calibration Check Standards are used as continuing checks for organic analysis. The equation for the Calibration Check Standard is:

$$\% \text{ Recovery} = 100(\text{result}/\text{true value})$$

Calibration Verification Standards (CVS) are second-source standards (a different lot from those used for generating a calibration curve) to check the accuracy of the calibration curve. The equation for the CVS is:

$$\% \text{ Recovery} = 100(\text{result}/\text{true value})$$

Method Accuracy Checks

Method Accuracy checks determine the acceptability of a batch of samples that have been subjected to a preparation step (i.e., digestion, extraction, combustion, etc.). The limits are method specified or statistically generated. The means and limits are tracked by generating statistical data. Statistically generated data must also meet the method-specified range, if there is one, to be used to demonstrate method accuracy. If the Method Accuracy check does not fall within the control limit, the batch is rejected and rerun for the failed constituent(s).

$$\text{Control Limit} = \begin{array}{l} \text{method / QAP specified} \\ \text{or} \\ \text{mean} \pm 3\text{sd} \end{array}$$

Laboratory Control Sample (LCS) consists of an aliquot of clean (control) matrix and is the same weight or volume as the sample matrix. The LCS is spiked with the same analytes at the same concentrations as the matrix spike. When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix, thus validating the laboratory's analytical process.

Control Blank Spikes (CBS) are blanks that are spiked with the constituents being analyzed.

Matrix Accuracy Checks

Matrix Spikes (MS) are samples that are spiked with the constituents being analyzed. They are only used as method accuracy checks when the matrix has demonstrated a lack of interference in the analysis.

% Matrix Spike Recovery = $100(\text{Sample Spike Result} - \text{Sample Amount}) / \text{Spike Amount}$

3.2 PRECISION

Performing a Matrix Duplicate (MD) or a Matrix Spike Duplicate (MSD), as specified by methodology generates precision information for quantitative measurements. The results of the duplication are compared to the initial accuracy check. The limits are method specified or statistically generated. As appropriate, the means and limits are tracked by generating statistical data. Statistically generated data must also meet the method specified control limit, if there is one, to be used to demonstrate precision. All precision outliers must be explained in the permanent laboratory record.

Control Limit = Method / QAP specified
 or
 Upper Control Limit

Laboratory Control Sample Duplicate (LCSD), or *Control Blank Spike Duplicates* (CBSD) are analyzed by the same procedure as the initial method accuracy check.

Matrix Spike Duplicates (MSD) are samples that are spiked with the constituents being analyzed. They are only used as precision checks when the matrix has demonstrated a lack of interference in the analysis.

Method Specified Limits for precision are compared to results generated by either:
Relative Percent Difference (RPD) = $100(\text{Range of Results} / \text{Average of Results})$
 or

Coefficient of Variation (CV) = $100(\text{standard deviation} / \text{mean})$

Upper Control Range Limits are generated by historical statistical techniques.
Upper Control Range Limit = Mean of Ranges x (D_2/d_2)

where: Range = absolute difference between replicates

D_2 = 99% confidence upper limit (equivalent to $\pm 3sd$) on a population mean of replicate averages (when $n=2$, $D_2=3.686$).

d_2 = factor that converts a range into a standard deviation between replicates (when $n=2$, $d_2=1.128$).

Source of D_2 and d_2 : ASTM Manual, *Quality Control of Materials*.

3.3 METHOD PREPARATION CHECKS

When a method preparation check is outside the prescribed limits, a notation, or *flag*, is documented in the final report. The limits are listed in Table 3.1.

Matrix Spikes (MS) are samples that are spiked with the constituents being analyzed. The results are compared to method specified limits or statistically generated limits for a determination of preparation efficiency.

Matrix Spike Duplicates (MSD) are the same as Matrix Spikes. The results are compared to the initial *Matrix Spike* result for a determination of the precision of preparation efficiency.

Surrogates are constituents that are not commonly found in the natural environment or in commercial waste products. They are added to the sample at the beginning of the preparation step. In organic chromatographic analysis, they are clearly distinguishable from target compounds. They are somewhat less susceptible to inferences and are used as an additional determination of preparation efficiency. The strategy used for evaluating surrogate recovery is as follows:

A. If the surrogate recovery falls outside the $\pm 3sd$ limits, and review of the chromatography does not indicate matrix interference, the analyst must:

(1) Rerun the extract.

If the result is within the limits, the analysis is finished.

If the result is still outside the limits, the sample must be re-extracted once and rerun on the instrument. If the result is within the limits, the analysis is finished. If it continues to fall outside the limits, the analysis is finished and the final report must be flagged (matrix interference can be assumed).

OR

(2) Re-extract the sample and rerun on the instrument.

If the result is within the limits, the analysis is finished. If it continues to fall outside the limits, the analysis is finished and the final report must be flagged (matrix interference can be assumed).

3.4 COMPLETENESS

A data package is considered complete when the following applicable items are finished:

- All appropriate logbooks contain all essential information;
- Data validation has been performed;
- Data files contain raw data, completed data validation forms, and all worksheets that document acceptable accuracy, and precision; and,
- Final results are placed into the laboratory record, LIMS or paper copies.

TABLE 3.1
ACCURACY, PRECISION, METHOD PREPARATION: OBJECTIVES AND LIMITS
***ICP Metals, AA Metals, Hg (CVAA), Cyanide, Reactive Sulfide**

| Analysis | Calibration Checks | Limits | Method Accuracy Checks | Limits | Method Precision Checks | Limits | Method Preparation Check (Efficiency) | Limits | Method Preparation Check (Precision) | Limits |
|------------------------------|---|--|-------------------------------------|---------|-------------------------|--------|---------------------------------------|-------------------|--------------------------------------|----------|
| ICP Metals (Totals and TCLP) | Calibration Verification Standard | 90-110% | Control Blank Spike | 75-125% | NA | NA | Matrix Spike | 75 -125% | Matrix Spike Duplicates | RPD<20 |
| | Continuing Calibration Blanks | <3 IDL or Ave of 2 or more repeated results <3 sd of background mean | | | | | Post-Digestion Spike | 75-125% | | |
| | | | | | | | | >50% ¹ | | |
| | Interelement Interference | As specified by method | | | | | TCLP Matrix Spike | | | |
| AA Metals | Calibration Verification Standard | 90-110% | Control Blank Spike (after initial) | 80-120% | NA | NA | Matrix Spike | 80-120% | Matrix Spike Duplicates | RPD<20 |
| Hg | Calibration Verification Standard | 90-110% | Control Blank Spike (after initial) | 80-120% | NA | NA | Matrix Spike | 80-120% | Matrix Spike Duplicates | RPD<20 |
| | | | | | | | TCLP Matrix Spike | >50% ¹ | | |
| Reactive Sulfide | NA | NA | Control standard | 75-125% | NA | NA | NA | NA | Sample Duplicate | <20% RPD |
| Cyanide | High and Low Calibration Verification Standards | Titrametric--N/A Colorometric - 85-115% | Control Blank Spike | 85-115% | NA | NA | Matrix Spike | 85-115% | Sample Duplicate | <20% RPD |

¹ Perform Method of Standard Additions when (1) the recovery of the spike TCLP extract is <50% and the unspiked extract does not exceed the regulatory level, or (2) the concentration of the metal in the extract is within 20% of the appropriate regulatory level.

**ACCURACY, PRECISION, METHOD PREPARATION: OBJECTIVES AND LIMITS
GCMS VOLATILES**

TABLE 3.1 (Cont.)

| Analysis | Calibration Checks | Limits | Method Accuracy Checks | Limits | Method Precision Checks | Limits | Method Preparation Check (Efficiency) | Limits | Method Preparation Check (Precision) | Limits |
|-----------------------|------------------------------------|-------------------------------------|--------------------------------------|-----------|-------------------------------|--------------------|---------------------------------------|-----------|--------------------------------------|--------------------|
| GCMS Volatiles | <u>Initial</u> BFB Tuning | As per Table 4, (8260) | Control Blank Spike (5 MS Compounds) | $\pm 3sd$ | Control Blank Spike Duplicate | <Upper Range Limit | Matrix Spike (5 MS Compounds) | $\pm 3sd$ | Matrix Spike Duplicates | <Upper Range Limit |
| | Continuing Calibration Compounds | RF RSD <30 | OR | | OR | | Surrogates (3) | $\pm 3sd$ | N/A | N/A |
| | System Performance Check Compounds | Min RRF 0.10 (0.30 for CBZ, TetCE) | Matrix Spike (5 MS Compounds) | $\pm 3sd$ | Matrix Spike Duplicate | <Upper Range Limit | | | | |
| | <u>Daily</u> SPCC | 0.10 (0.30 for CBZ, TetCE) | | | | | | | | |
| | CCC | <25% difference from initial | | | | | | | | |
| | Internal Standard EICP | As required by 8260 | | | | | | | | |

**ACCURACY, PRECISION, METHOD PREPARATION: OBJECTIVES AND LIMITS
GCMS SEMIVOLATILES**

TABLE 3.1 (Cont.)

| Analysis | Calibration Checks | Limits | Method Accuracy Checks | Limits | Method Precision Checks | Limits | Method Preparation Check (Efficiency) | Limits | Method Preparation Check (Precision) | Limits |
|----------------------------|------------------------------------|------------------------------|---------------------------------------|-----------|-------------------------------|--------------------|---------------------------------------|-----------|--------------------------------------|--------------------|
| GCMS Semi-volatiles | <u>Initial</u> DFTPP Tuning | As per Table 3, (8270A) | Control Blank Spike (11 MS Compounds) | $\pm 3sd$ | Control Blank Spike Duplicate | <Upper Range Limit | Matrix Spike (11 MS Compounds) | $\pm 3sd$ | Matrix Spike Duplicates | <Upper Range Limit |
| | Continuing Calibration Compounds | RF RSD <30 | OR | | OR | | Surrogates (6) | $\pm 3sd$ | N/A | N/A |
| | System Performance Check Compounds | Min RRF 0.050 | Matrix Spike (11 MS Compounds) | $\pm 3sd$ | Matrix Spike Duplicate | <Upper Range Limit | | | | |
| | <u>Daily</u> SPCC | Min RRF 0.050 | | | | | | | | |
| | CCC | <30% difference from initial | | | | | | | | |
| | Internal Standard EICP | As required by 8270 | | | | | | | | |

**ACCURACY, PRECISION, METHOD PREPARATION: OBJECTIVES AND LIMITS
PESTICIDES, PCBs, HOMOLOGS**

TABLE 3.1 (Cont.)

| Analysis | Calibration Checks | Limits | Method Accuracy Checks | Limits | Method Precision Checks | Limits | Method Preparation Check (Efficiency) | Limits | Method Preparation Check (Precision) | Limits |
|-------------------|---|--|--|--------|--|-----------------------|---------------------------------------|--------|--------------------------------------|--------------------------|
| Pesticides | <u>Initial</u> Calibration Factor (External Std Method) | RSD<20 | Control Blank Spike (6MS Compounds) | ±3sd | Control Blank Spike Duplicate | <Upper Range Limit | Matrix Spike (6 MS Compounds) | ±3sd | Matrix Spike Duplicates | <Upper Range Limit |
| | | | OR | | OR | | Surrogates | ±3sd | N/A | N/A |
| | Response Factor (Internal Std Method) | RSD<20 | Matrix Spike (6 MS Compounds) | ±3sd | Matrix Spike Duplicate | <Upper Range Limit | | | | |
| | 4,4'-DDT and Endrin Breakdown | <15% | | | | | | | | |
| | <u>Daily</u> Continuing Calibration Compounds | 85-115% (or ave of all 85- 115%) | | | | | | | | |
| PCBs | <u>Initial</u> Calibration Factor (External Std Method) | RSD<20 | Laboratory Control Sample | ±3sd | Laboratory Control Sample Duplicate | <Upper Range Limit | Matrix Spike | ±3sd | Matrix Spike Duplicates | <Upper Range Limit |
| | | | OR | | OR | | Surrogates | ±3sd | N/A | N/A |
| | <u>Daily</u> Continuing Calibration Compounds | 85-115% | Matrix Spike | ±3sd | Matrix Spike Duplicate | <Upper Range Limit | | | | |

**ACCURACY, PRECISION, METHOD PREPARATION: OBJECTIVES AND LIMITS
HERBICIDES, METHANOL**

TABLE 3.1 (Cont.)

| Analysis | Calibration Checks | Limits | Method Accuracy Checks | Limits | Method Precision Checks | Limits | Method Preparation Check (Efficiency) | Limits | Method Preparation Check (Precision) | Limits |
|---------------------------------------|---|---------|--|--------|-------------------------------|--------------------|---------------------------------------|--------|--------------------------------------|--------------------|
| Herbicides | <u>Initial</u> Calibration Factor (External Std Method) | RSD<20 | Control Blank Spike (3 MS Compounds) | ±3sd | Control Blank Spike Duplicate | <Upper Range Limit | Matrix Spike (3 MS Compounds) | ±3sd | Matrix Spike Duplicates | <Upper Range Limit |
| | <u>Daily</u> Continuing Calibration Compounds | 85-115% | OR Matrix Spike (3 MS Compounds) | ±3sd | OR Matrix Spike Duplicate | <Upper Range Limit | Surrogates | ±3sd | N/A | N/A |
| Methanol & Other Volatiles | <u>Initial</u> Calibration Factor (External Std Method) | RSD<20 | Control Blank Spike | ±3sd | Control Blank Spike Duplicate | <Upper Range Limit | Matrix Spike | ±3sd | Matrix Spike Duplicates | <Upper Range Limit |
| | <u>Daily</u> Continuing Calibration Compounds | 85-115% | OR Matrix Spike | ±3sd | OR Matrix Spike Duplicate | <Upper Range Limit | Surrogates | ±3sd | N/A | N/A |

**ACCURACY, PRECISION, METHOD PREPARATION: OBJECTIVES AND LIMITS
DIOXINS/FURANS (LOW RESOLUTION)**

TABLE 3.1 (Cont.)

| Analysis | Calibration Checks | Limits | Method Accuracy Checks | Limits | Method Precision Checks | Limits | Method Preparation Check (Efficiency) | Limits | Method Preparation Check (Precision) | Limits |
|--|--|--|------------------------|--------|-------------------------|--------|---------------------------------------|---------|--------------------------------------|--------|
| Dioxins/Furans (Low Resolution) | <u>Initial</u> Relative Response Factor | RSD<15 Triplicate injections of each level. | N/A | N/A | N/A | N/A | Internal to Recovery Standard | 40-120% | N/A | N/A |
| | <u>Initial Tuning</u> Isotopic Ratio Measurements w/ Column Performance Check Mixture | As per 8280 Table 3 | | | | | | | | |
| | Valley Percent Resolution for 2,3,7,8-TCDD and 1,2,3,4-TCDD | <25 | | | | | | | | |
| | <u>Daily/Continuing</u> Mid-level Check Standard | ±30% of the Initial Calibration RRFs | | | | | | | | |
| | <u>Daily Tuning</u> Same as Initial Tuning | Same as Initial Tuning | | | | | | | | |

ACCURACY, PRECISION, METHOD PREPARATION: OBJECTIVES AND LIMITS
DIOXINS/FURANS (HIGH RESOLUTION)

TABLE 3.1 (Cont.)

| Analysis | Calibration Checks | Limits | Method Accuracy Checks | Limits | Method Precision Checks | Limits | Method Preparation Check (Efficiency) | Limits | Method Preparation Check (Precision) | Limits |
|---|--|--|------------------------|--------|-------------------------|--------|---------------------------------------|---------|---|--------|
| Dioxins/Furans (High Resolution) | <u>Initial</u> Relative Response Factor 17 unlabeled 9 labeled | RSD<20 RSD<30 | N/A | N/A | N/A | N/A | Internal to Recovery Standard | 40-135% | Matrix Spikes and Matrix Spike Duplicates | RPD<20 |
| | <u>Initial Tuning</u> Isotopic Ratio Measurements for 17 unlabeled 11 labeled | As per 8290 Table 8 | | | | | | | Unspiked Duplicates | RPD<25 |
| | Valley Percent Resolution for Column Performance Check Standard | <25 | | | | | | | | |
| | Valley Percent PFK m/z 304.09824 & TCDF m/z 303.9016 | <10 | | | | | | | | |
| | <u>Daily/Continuing</u> High Resolution Calibration Compound-3 17 unlabeled 9 labeled | ±20% ±30% of the Initial Calibration RRFs | | | | | | | | |
| | <u>Daily Tuning</u> Same as Initial Tuning | Same as Initial Tuning | | | | | | | | |
| | <u>End Cal Check</u> HRCC-3 17 unlabeled 9 labeled | RPD<25 RPD<35 of the previous 12hr HRCC-3 Check | | | | | | | | |

| Analysis | Calibration Checks | Limits | Method Accuracy Checks | Limits | Method Precision Checks | Limits | Method Preparation Check (Efficiency) | Limits | Method Preparation Check (Precision) | Limits |
|----------|--------------------|--------|------------------------|--------|-------------------------|--------|---------------------------------------|--------|--------------------------------------|--------|
| | | | | | | | | | | |

**ACCURACY, PRECISION, METHOD PREPARATION: OBJECTIVES AND LIMITS
WET CHEMISTRY**

TABLE 3.1 (Cont.)

| Analysis | Calibration Checks | Limits | Method Accuracy Checks | Limits | Method Precision Checks | Limits | Method Preparation Check (Efficiency) | Limits | Method Preparation Check (Precision) | Limits |
|--------------------------------------|--|---|--|--|-------------------------------------|--|---------------------------------------|------------|--------------------------------------|--------------------|
| Heat of Combustion (BTU) | <u>Initial</u> Generate an EE value with 6 runs of benzoic acid on two non-consecutive days <u>Daily</u> Benzoic Acid | Results must be within 56 BTU/lb of each other 11373 BTU/lb ± 56 | Laboratory Control Sample | ± 200 BTU/lb or ± 3 sd of historical mean (use the more stringent) | Laboratory Control Sample Duplicate | Within 56 BTU/lb of initial LCS run or <upper Range Limit (use the more stringent) | N/A | N/A | N/A | N/A |
| Chloride (for Total Halogens) | Calibration Verification Standard | 90-110% | Laboratory Control Sample | ± 3 sd of historical mean | Laboratory Control Sample Duplicate | <Upper Range Limit | Matrix Spike | ± 3 sd | Matrix Spike Duplicates | <Upper Range Limit |
| Setaflash Ignitability | n-Butanol OR p-Xylene | 98°F ± 2 81°F ± 2 | Select a compound with a flashpoint near 140°F | Pass/Fail | N/A | N/A | N/A | N/A | N/A | N/A |
| Pensky-Marten Ignitability | p-Xylene OR per method D93 | 81°F ± 2 per method D93 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

| | | | | | | | | | | |
|------------------------------|----------|---------|-----|-----|-----|-----|-----|-----|-----------|--------|
| Percent Moisture: | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Duplicate | RPD<10 |
| Evaporation | Hydranal | 90-110% | N/A | N/A | N/A | N/A | N/A | N/A | Duplicate | RPD<10 |
| Karl Fischer | | | | | | | | | | |

ACCURACY, PRECISION, METHOD PREPARATION: OBJECTIVES AND LIMITS

TABLE 3.1 (Cont.)

Wet Chemistry

| Analysis | Calibration Checks | Limits | Method Accuracy Checks | Limits | Method Precision Checks | Limits | Method Preparation Check (Efficiency) | Limits | Method Preparation Check (Precision) | Limits |
|--|-----------------------------------|---------------|-------------------------------|-------------------------|-------------------------------------|--------------------|--|---------------|---|--------------------|
| Percent Ash | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Duplicate | RPD<10 |
| Fluoride (from Combustate) | Calibration Verification Standard | 90-110% | Laboratory Control Sample | ±3sd of historical mean | Laboratory Control Sample Duplicate | <Upper Range Limit | Matrix Spike | ±3sd | Matrix Spike Duplicates | <Upper Range Limit |
| Viscosity | Calibration Verification Standard | 90-110% | N/A | N/A | N/A | N/A | N/A | N/A | Duplicate | RPD<10 |
| Specific Gravity / Bulk Density | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Duplicate | RPD<10 |

| | | | | | | | | | | |
|-----------------|---|---------------------|-----------------------------------|----------------|-----|-----|-----|-----|---------------------------------|--|
| pH: | | | | | | | | | | |
| Water | pH Buffers appropriate for waste being tested | N/A | Calibration Verification Standard | ±0.05 pH Units | N/A | N/A | N/A | N/A | Duplicates on all water samples | ±0.1 pH Units |
| pH Paper | Check each lot against NIST traceable buffer | ± 1 color increment | N/A | N/A | N/A | N/A | N/A | N/A | Duplicate per batch | ±1 color increment |
| Screen | Check each lot against NIST traceable buffer | ± 1 color increment | N/A | N/A | N/A | N/A | N/A | N/A | Duplicate on all samples | ±1 color increment |
| pH Paper | Check each lot against NIST traceable buffer | N/A | Calibration Verification Standard | ±0.05 pH Units | N/A | N/A | N/A | N/A | Duplicate per batch | ±1 color increment on narrow range paper |
| Waste | pH Buffers appropriate for waste being tested | N/A | Calibration Verification Standard | ±0.05 pH Units | N/A | N/A | N/A | N/A | Duplicate per batch | ±0.1 pH Units |
| Solids | pH Buffers appropriate for waste being tested | | | | | | | | | ±0.1 pH Units |

4.0 SAMPLING PROCEDURES

A comprehensive program is essential in order to ensure that all samples taken are appropriate for the analysis being performed, that the analysis is complete and accurate, and that the final reports contain sufficient information to achieve their intended purpose. That purpose is primarily the safe and efficient treatment and disposal of hazardous waste.

Waste samples do not require preservation but are subject to holding times. The analytical methods included in this Quality Assurance Plan refer to the optimum means of preservation. Since the chemical make-up of certain samples can alter the effectiveness of the sample preservation measures, all samples are analyzed as soon as possible after sampling and before the maximum recommended holding time has expired.

Table 4-1 indicates the parameter of interest, appropriate container, preservation, and maximum holding times for samples of various matrix types. A copy of this table may be sent to generators to assist them in properly preserving the integrity of samples sent to laboratories for analysis.

4.1 SAMPLE COLLECTION

The first step in any analysis is the collection of the sample. A wide range of techniques and sampling devices are utilized to sample waste materials in containers, tanks, and process streams.

The sampling methodology is determined by the sampling strategy employed. Sampling may be representative, composite, grab or surface area depending on sample strategy. The methods and equipment used for sampling waste material vary with the form and consistency of the waste materials, and by the type and purpose of the testing.. The following sampling procedures may be utilized for the following types of materials:

- Extremely viscous liquids. ASTM D140;SW846
- Crushed or powdered material ASTM D346;SW846
- Soil or rock-like material ASTM D420;SW846
- Soil-like material ASTM 1452;SW846
- Fly-ash-like material. ASTM D2234;SW846
- Stratified liquids EPA-600/2-80-018;SW846

Table 4.1
SAMPLING CONTAINERS, PRESERVATION, AND HOLDING TIMES

| MATRIX | ANALYSIS | CONTAINER | PRESERVATION * | MAXIMUM HOLDING TIME |
|---|-------------------------------|-----------------------|-------------------------------|---|
| Solids, Organic Liquids, Sludges | Semi-Volatile Organics | Glass | 4°C | Extraction: 14 Days Extract: 40 Days |
| | Volatile Organics | VOA Vial / (Glass) ** | 4°C | 14 Days |
| | ICP Metals | Glass, Plastic | 4°C | 6 Months |
| | Mercury | Glass, Plastic | 4°C | 28 Days |
| | Cyanide | Glass, Plastic | 4°C | 14 Days |
| | Wet Chemistry and Fingerprint | Glass, Plastic | 4°C | 6 months |
| Aqueous Liquids | Semi-Volatile Organics | Glass | 4°C | Extraction: 7 Days Extract: 40 Days |
| | Volatile Organics | VOA Vial / (Glass) ** | 4°C | 14 Days |
| | ICP Metals | Glass, Plastic | 4°C, HNO ₃ to pH<2 | 6 Months |
| | Mercury | Glass, Plastic | 4°C, HNO ₃ to pH<2 | 38 Days w/Glass 13 Days w/Plastic |
| | Cyanide | Glass, Plastic | 4°C, NaOH to pH>12 | 14 Days |
| | Wet Chemistry and Fingerprint | Glass, Plastic | 4°C | 6 months |

* Hazardous Waste Samples Require No Preservation (Sources: SW-846 Volume II, Chapter 9, Page NINE-71, Paragraph 5., and Paul White, USEPA Method and Information Exchange (703) 676-4690.)

** Glass for Hazardous Waste samples only.

4.2 SAMPLING SMALL CONTAINERS

See Section 4.8 of the main body of the Waste Analysis Plan

4.3 SAMPLING TANKS

See Section 4.9 of the main body of the Waste Analysis Plan

4.4 SAMPLING BULK WASTE

See Section 4.10 of the main body of the Waste Analysis Plan

4.5 SAMPLING SURFACES

The 40 CFR 761.123 contains standardized EPA procedures for taking PCB surface wipe samples. The definition constitutes the minimum requirements for an appropriate wipe testing protocol. A standard size template (10 cm X 10 cm) is used to identify the sampling area; the wiping media is an all collection gauze pad which has been saturated with hexane. The wipe is performed quickly once the gauze is exposed to air.

4.6 FROZEN WASTE:

See Section 4.11 of the main body of the Waste Analysis Plan

4.7 OTHER SAMPLES, i.e., PROCESS EQUIPMENT, CONTAINMENT, SUMPS, ETC.:

See Section 4.12 of the main body of the Waste Analysis Plan

5.0 TRACEABILITY

The facility routinely follows sample traceability for all internal sampling and analysis. This involves the documentation of procedures so that a set of data can be traced back through the analyst, to the person performing the sampling, and then to the waste itself. All samples receive a unique sample identification number to facilitate this process.

Should Chain-of-Custody be warranted, i.e., shipping samples off-site, then procedures in Section 7.4, Chain-of-Custody are followed:

In order to trace sample possession from the time of collection, a traceability record is filled out and accompanies the sample. The record contains the following information:

- sample ID;
- signature of the collector;
- date collected;
- waste type;
- signature of persons involved;
- inclusive date of possession; and
- cross reference to manifest (if applicable).

5.1 SAMPLE LABELS

Sample labels are necessary to prevent misidentification of samples. The labels are gummed and affixed to the containers prior to or at the time of sampling. The labels are filled out at the time of collection.

5.2 SAMPLE SEALS

Sample seals are used to detect any tampering during shipment for samples sent off site. The seals are initialed, dated, and then affixed to the sample containers or shipping containers before the samples leave the custody of the lab. Sample seals are not necessary for samples taken onsite at the facility and sent to the onsite laboratory or if being transported by GMF personnel or the personnel from the laboratory that is going to perform the analysis. They are required for Chain-of-Custody events where Clean Harbors personnel are not transporting the samples.

5.3 SAMPLING RECORD

All information pertinent to field surveys or sampling is recorded in a record. Since sampling situations vary widely, no set of rules can be given as to the extent of information that must be entered in the record. However, sufficient information is recorded to allow someone to reconstruct the sampling without reliance on the collector's memory. This record includes at a minimum the following information:

- location of sampling point;
- volume of samples taken;
- date of collection;
- sample identification number;
- person sampling;
- comments or observations;
- sampling methodology

5.4 CHAIN-OF-CUSTODY

Sample chain-of-custody is maintained as required by the client or regulatory agency. A chain-of-custody is used to ensure the data from sample collection to data reporting is legally defensible. This includes the ability to trace the possession and handling of samples from the time of collection through analysis and final disposition.

The components of the chain-of-custody include the following: sample seals, a log, and chain-of-custody record. The procedures for their use are described in further detail.

A sample is considered to be under a person's custody if:

- it is in a person's physical possession;
- in view of the person after possession has taken place;
- secured by that person so that undetected tampering with the sample cannot occur; or
- secured by that person in an area which is restricted to authorized personnel.

Upon receipt of the sample(s) in the laboratory they are entered into the sample receipt log. All chain-of-custody samples are directed to the sample custodian. The shipping containers and sample bottles are inspected for proper seals and labels. The contents of the containers are then checked against the chain-of-custody record. The chain-of-custody record may include but is not limited to the following:

- Sampler Signature
- Date Sampled
- Sample ID
- Type of sample, i.e. composite or grab
- Number of Containers
- A place for comments
- Blocks for the person relinquishing the sample to sign, print his/her name, and put the date and time the sample was relinquished.
- Blocks for the person receiving the sample to sign, print his/her name, and put the date and time the sample was received.

If the chain-of-custody information is complete and the integrity of the samples has not been broken, each sample is assigned a unique identification number. If the information on the chain-of-custody record is not complete, the sample custodian shall contact the appropriate facility personnel to obtain the missing information, and a unique identification number is assigned. All problem resolutions will be documented in the sample receipt log.

The samples are then put into storage to await analysis. Maximum holding times for the samples are described in Section 6 of this Quality Assurance Plan.

6.0 CALIBRATION PROCEDURES AND FREQUENCIES

All instruments are calibrated in accordance with the appropriate analytical method. The methods commonly utilized are referenced in Section 9.1. These methods cite the appropriate calibration procedures and frequencies. In addition, all instruments are calibrated in accordance with the manufacturer's procedures.

Prior to the analysis of samples, instruments are either calibrated or their calibrations verified. Calibration curves of signal response versus concentration are generated on each applicable analytical instrument.

Calibrations are evaluated using calibration check standards. Should this sample fall outside of acceptable limits as specified by the method, the instrument is recalibrated. Table 8.1 summarizes instrument calibration procedures and frequencies.

Sources of reference materials include the National Bureau of Standards, and reputable commercial vendors. PCB reference materials will be obtained from EPA's reference laboratory or from a suitable chemical supply firm such as Supelco, Foxboro, Radian, or ULTRA Scientific.

**TABLE 6.1
SUMMARY OF
CALIBRATION PROCEDURES AND FREQUENCIES**

| <u>Instrument</u> | <u>Standards</u> | <u>Frequency</u> |
|-------------------|---|---|
| GC | Mid-level Standard | Daily and every 10th sample. |
| | 5-7 Standards | Recalibration if CVS is greater than 15% of expected value. |
| GC/MS | Mid-level Standard | Daily |
| | 5-7 Standards | Recalibration if CCC* is greater than 30% for semi-volatiles and 25% for volatiles. |
| | Mass Calibration (GC/MS tuning) | Every 12 hours. |
| ICP | Calibration Verification Standard (CVS) | Beginning and end of analytical run and every 10th sample. |
| | 3-5 Standards | Recalibration if CVS not within $\pm 10\%$ of expected value. |
| AAS | 3-5 Standards | Analysis of standards at the beginning of an analytical run. |

* CCC = Continuing Calibration Check

7.0 ANALYTICAL METHODS

The analytical methods used are listed in Section 3 of the Waste Analysis Plan.

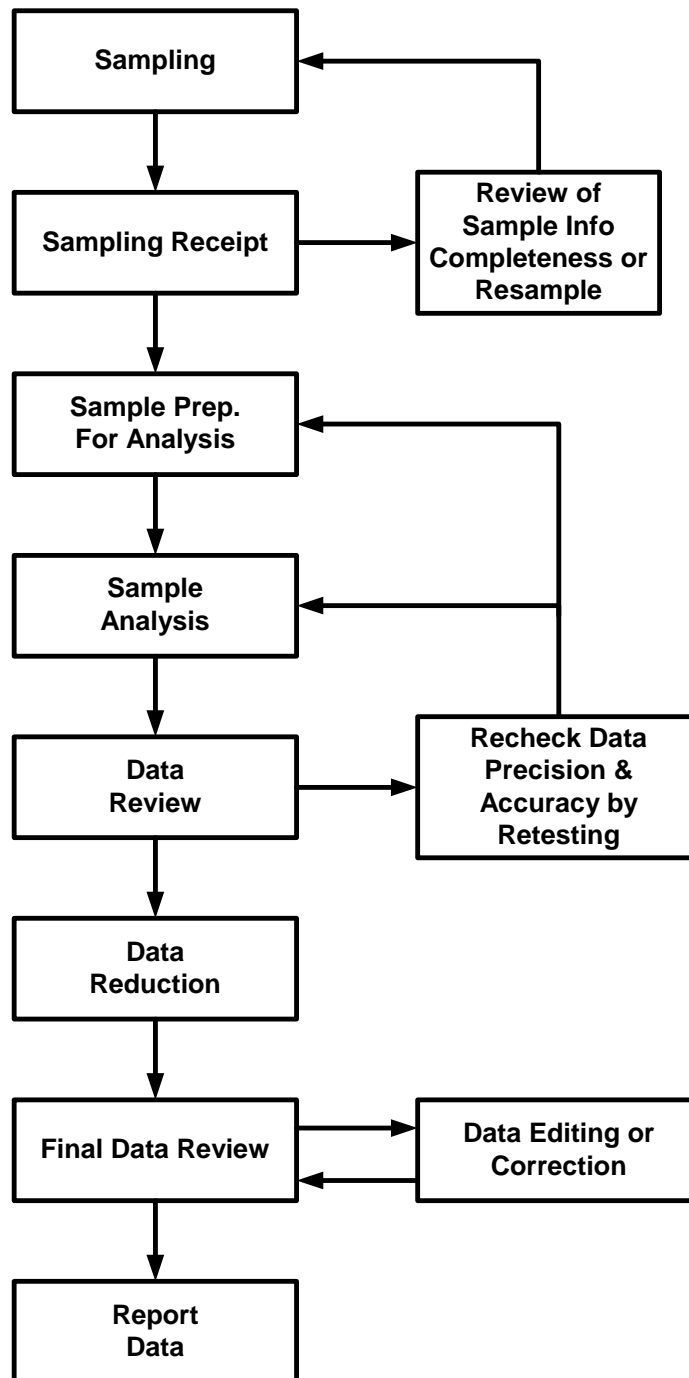
8.0 DATA REDUCTION, VALIDATION, AND REPORTING

Data reduction procedures are designed to include several levels of data review. Data validation begins with the person generating data. The chemist or analyst makes the initial calculations and records the results. Each section supervisor or designee is then responsible for reviewing data and as well as 10% of hand calculations generated by their respective group.

Discrepancies and/or errors are corrected or referred back to the chemist or analyst performing the analysis. If necessary, the samples are reprepared and reanalyzed.

Figure 8.1 depicts the data reporting scheme.

FIGURE 8.1 DATA REPORTING



8.1 DATA REDUCTION

Raw data from chromatographs, spectrometers, recorders, and physical measurements are reduced to yield concentrations of the analytes of interest. All data reduction is performed in accordance with the applicable method as referenced in section 9.0.

Data reduction, which is not computerized, is recorded in ink on worksheets or in lab notebooks.

8.2 DATA VALIDATION

All data are validated prior to being disseminated from the laboratory. The data are reviewed for both editorial and technical validity.

The editorial review consists of a check for typographical, transpositional, and omissions errors. This review also includes a review of any text which may accompany the data.

The technical review consists of a check to see that all precision, accuracy, and detection limit requirements have been met. In addition, the data are also reviewed for completeness and representativeness.

8.3 DATA REPORTING

Once data have been reviewed and all requirements for completeness, representativeness, precision, accuracy, and limits of detection have been met, results are reported to the client.

Typically, only the final reduced data is reported. All QC data, calculations, chromatograms, etc., which support the reported data are retained in the laboratory records.

9.0 INTERNAL QUALITY CONTROL CHECKS

A minimum level of quality control is maintained as described in Chapter 1 "Quality Control," SW-846.

Table 3.1 describes the quality control strategies for each analysis. A glossary of terms is listed in Section 11.2.

9.1 FIELD QUALITY CONTROL

The procedures that are used in the field to ensure data quality include:

- The use of accepted sampling techniques.
- The justification and documentation of any field action contrary to accepted or specified techniques.
- The documentation of activities, such as container preparation, instrument calibration, etc.
- The documentation of field measurement Quality Control Data.
- The documentation of field activities.
- The documentation of post-field activities including sample shipment and receipt, equipment check in, and de-briefing.

- The generation of Quality Control Samples, including duplicates.

9.2 ANALYTICAL QUALITY CONTROL

The procedures used in the laboratory to ensure analytical data quality include:

Duplicate Spike - is analyzed (when applicable) with every analytical batch or once in ten samples, whichever is more frequent. Analytes stipulated by the method applicable regulations, or agreement with the client, are spiked into the sample. Selection of the sample to be spiked and/or split depends on the information required and the variety of conditions within a typical matrix. In some situations, requirements of the site being sampled may dictate that the person sampling select a sample to be spiked and split based on a pre-visit evaluation or on-site inspection. This does not preclude the laboratory's spiking a sample of its own selection. In most cases, the laboratory will select the sample to be spiked. The laboratory's selection is based on the attempt to determine the extent of matrix bias or interference on the analyte recovery and sample to sample precision.

Blanks - accompany each batch of samples and are carried through the entire analytical procedure.

Surrogate Standards - are spiked into samples according to the appropriate analytical methods. Surrogate spike recoveries will fall within the control limits set to be in accordance with the procedures specified in the method.

Check Samples - containing a representative subset of the analytes of interest are used to evaluate equipment performance.

Clean-Ups - are used to eliminate interferences in organic extracts. All associated QC samples must undergo the same procedures as field samples.

Column-Check Sample - is used to verify column performance. The elution pattern is reconfirmed after activating or de-activating a batch of absorbent.

Instrument Adjustment - requirements and procedures are instrument and method specific. Analytical instrumentation is tuned and aligned in accordance with requirements which are specific to the instrumentation procedures employed.

Calibration - is performed in accordance with the manufactures' requirements and the procedures specified in the applicable method.

9.3 SPECIFIC REQUIREMENTS FOR INORGANIC ANALYSIS

Standard curves used in the determination of inorganic analytes are prepared as follows.

Standard curves derived from data consisting of one reagent blank and at least one additional concentration are prepared for each analyte. The response for each prepared standard is based upon the average of three replicate readings of each standard. Sample results must fall within the concentration range of the standard curve. If the results of the verification are not within $\pm 10\%$ for ICP and 10% for Atomic Absorption of the original standard curve, a reference standard is employed to determine if the discrepancy is with the standard or with the instrument.

New standards are prepared on a quarterly basis. All data used in drawing or describing the curve are indicated on the curve or its description and a record is made of this verification.

Standard deviations and relative standard deviations are calculated from the absolute recovery of analytes from the spike sample duplicates.

9.4 SPECIFIC REQUIREMENTS FOR ORGANIC ANALYSIS

The following requirements are applied to the analysis of samples by gas chromatography, liquid chromatography and gas chromatography/mass spectrometry.

The calibration of each instrument is verified at frequencies specified in the methods. Standard curves are prepared as specified in the methods.

The tune of each GC/MS system used for the determination of organic analytes is checked with 4-bromofluorobenzene (BFB) for determinations of volatiles and with decafluorotriphenylphosphine (DFTPP) for determination of semi-volatiles. The required ion abundance criteria are met before determination of any analytes.

If the system does not meet the required specification for one or more of the required ions, the instrument is retuned and rechecked before proceeding with sample analysis. The tune performance check criteria are achieved daily or for each 12 hour operation period, whichever is more frequent.

The background subtraction is straightforward and designed only to eliminate column bleed or instrument background. Background subtraction actions resulting in spectral distortions for the sole purpose of meeting special requirements are contrary to the objectives of Quality Assurance and are unacceptable.

For determinations by HPLC or GC, the instrument calibration is verified as specified in the

methods.

10.0 PROFICIENCY TESTING AND SYSTEM AUDITS

The laboratory is subject to both internal and external audits, in order to monitor the capability and performance of the total measurement systems.

The systems audit consists of evaluation of all components of the measurement system to determine their proper selection and use. This audit includes a careful evaluation of both field and laboratory quality control procedures. System audits are normally performed prior to or shortly after a new system has been implemented. Performance audits are then performed on a routine basis, at least semi-annually, during the lifetime or continuing operation of the system.

10.1 INTERNAL AND EXTERNAL PROFICIENCY TESTING

The laboratories participate in blind round robin tests with other laboratories who perform environmental analysis when available. If round robins are available more frequently than semi-annually, participation is only required semi-annually.

A set of blind samples are split among the laboratories. This helps management evaluate the precision and accuracy of its own laboratories, as well as provide information about the amount of inter-laboratory deviation which can be associated with a particular method. If the laboratory fails a proficiency testing audit, a corrective action plan will be generated and corrective action taken as described in Section 14 of this QAP.

For samples that are reported for certification purposes, the following rules apply:

The laboratory will follow the proficiency testing provider's instructions for preparing the proficiency testing sample and will analyze the proficiency testing sample as if it were a client sample.

The following are strictly prohibited:

- performing multiple analyses (replicates, duplicates) which are not normally performed in the course of analysis of routine samples;
- averaging the results of multiple analyses for reporting when not specifically required by the method;

The laboratory will not:

- discuss the results of a proficiency testing audit with any other laboratory until after the deadline for receipt of results by the proficiency testing provider;

The laboratory will maintain a copy of all proficiency testing records, including analytical worksheets.

The Technical Manager of the laboratory will sign and retain an attestation statement stating that the certified laboratory followed the proficiency testing provider's instructions for preparing the proficiency testing sample and analyzed the proficiency testing sample as if it were a client sample.

The laboratory staff will be trained on the proper handling of proficiency testing sample.

10.2 INTERNAL SYSTEM AUDITS

Internal audits are performed on a semi-annual basis. The audit is conducted by the Quality Control Manager under the direction of the Facility Manager or designee. The audit report is due 30 days following the conclusion of the audit.

The audit evaluates the system from the receipt of samples to the reporting of results. Specific areas which are addressed include: sample flow through the lab, sample storage, sample preparation, analysis, data reduction, data reporting, QC samples, logbooks, and raw data storage.

11.0 PREVENTATIVE MAINTENANCE

The laboratories are equipped and maintained to provide the best conditions possible for performing laboratory analysis. Equipment which has become obsolete by the advancement of technology is replaced or upgraded. All equipment is inspected regularly to ensure that it is in proper working order.

Equipment is maintained in accordance with the manufacturer's recommendations. All major pieces of equipment are covered by service contracts from the manufacturer. Whenever possible, an inventory of spare parts which typically need replacement is maintained, this includes such compounds as septa, GC columns, ion volumes, torches, regulators, and so forth.

Table 13.1 lists pieces of equipment or components which are routinely maintained, the frequency at which they are serviced and the type of maintenance performed.

**TABLE 11.1
MAINTENANCE SCHEDULE**

| EQUIPMENT COMPONENT | MAINTENANCE PERFORMED | FREQUENCY |
|---|--|---|
| <u>Gas Chromatographs</u> septa column syringes inlet liner (tube) | replace replace/condition replace clean/replace | as required as required as required as required |
| ELCD (HALL) Ni catalyst solvent resin | leak check replace/condition replace | as required as required as required |
| ECD | wipe test leak check factory clean/recondition | semi-annually as required as required |
| PID lamp | leak check replace | as required as required |
| FID jets | leak check clean | as required as required |
| ICP nebulizer pump tubing air filters torch | clean/replace replace clean clean/replace | as required as required as required as required |
| <u>MERCURY ANALYZER</u> drying tube desiccant sample tubing stannous chloride tubing drain tubing lamp optics | replace replace replace replace replace clean | daily twice/week as required as required as required as required |
| <u>CALORIMETER</u> bombs tubing | calibration/certification check/replace | after 500 firings daily |
| <u>COMPRESSED GASES</u> fittings traps | leak checks replace | as required as required |

12.0 CORRECTIVE ACTION

Quality Control procedures are designed to identify the need for corrective action. Most corrective actions are performed by the chemists doing the analysis, and are usually as simple as recalibrating an instrument should the instrument check sample be out of its acceptable range. Most corrective actions are found in methods, standard operating manuals, and instrument manuals.

Corrective actions may also be initiated as a result of various Quality Assurance activities, including:

- 1) performance audits,
- 2) system audits,
- 3) laboratory or interfield comparison studies,
- 4) program audits, and
- 5) final review of data reports

Corrective action reports will be sent to the Laboratory Manager for review and implementation.

The standard approach for corrective action consists of the following:

- 1) define the problem,
- 2) determine the cause(s) of the problem,
- 3) determine possible solutions to the problem,
- 4) implement the corrective action, and
- 5) verify that the corrective action is effective.

All employees are encouraged to bring to their supervisor's attention any problem or practice which they feel may effect data quality.

13.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

The Quality Control Manager is responsible for reporting to the laboratory manager on the performance of measurement systems and data quality. The Laboratory and Facility Manager reviews and returns the report. These reports include:

- 1) Assessment of measurement data accuracy, precision, and completeness.
- 2) Results of performance audits.
- 3) Results of system audits.
- 4) Significant Quality Assurance problems and recommended solutions.

APPENDIX 2

GUNDLE LINING SYSTEMS, INC.

LINER/LEACHATE COMPATIBILITY REPORT

Appendix 3 –

Approved Waste Code List

Appendix 3 - Approved Waste Code List

| EPA Waste Code List | Module III (Containers) | Module IV (Tanks) | Module IV (Tanks) | Module VI (Landfills) |
|---------------------|----------------------------|---------------------------|---------------------------|-----------------------------|
| | May store these wastes | May store these wastes | May treat these wastes | May dispose these wastes |
| | CONTAINERS | STORAGE TANKS | STABILIZATION TANKS | LANDFILLS |
| (See Note 1) | (See Notes 2, 5) | (See Notes 2, 4, 5) | (See Notes 2, 4, 5) | (See Notes 3, 5) |
| D001 | D001 | D001 | D001 | D001 |
| D002 | D002 | D002 | D002 | D002 |
| D003 | D003 | D003 | D003 | D003 |
| D004 | D004 | D004 | D004 | D004 |
| D005 | D005 | D005 | D005 | D005 |
| D006 | D006 | D006 | D006 | D006 |
| D007 | D007 | D007 | D007 | D007 |
| D008 | D008 | D008 | D008 | D008 |
| D009 | D009 | D009 | D009 | D009 |
| D010 | D010 | D010 | D010 | D010 |
| D011 | D011 | D011 | D011 | D011 |
| D012 | D012 | D012 | D012 | D012 |
| D013 | D013 | D013 | D013 | D013 |
| D014 | D014 | D014 | D014 | D014 |
| D015 | D015 | D015 | D015 | D015 |
| D016 | D016 | D016 | D016 | D016 |
| D017 | D017 | D017 | D017 | D017 |
| D018 | D018 | D018 | D018 | D018 |
| D019 | D019 | D019 | D019 | D019 |
| D020 | D020 | D020 | D020 | D020 |
| D021 | D021 | D021 | D021 | D021 |
| D022 | D022 | D022 | D022 | D022 |
| D023 | D023 | D023 | D023 | D023 |
| D024 | D024 | D024 | D024 | D024 |
| D025 | D025 | D025 | D025 | D025 |
| D026 | D026 | D026 | D026 | D026 |
| D027 | D027 | D027 | D027 | D027 |
| D028 | D028 | D028 | D028 | D028 |
| D029 | D029 | D029 | D029 | D029 |
| D030 | D030 | D030 | D030 | D030 |
| D031 | D031 | D031 | D031 | D031 |
| D032 | D032 | D032 | D032 | D032 |
| D033 | D033 | D033 | D033 | D033 |
| D034 | D034 | D034 | D034 | D034 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|---------------------|--|--|--|--|
| D035 | D035 | D035 | D035 | D035 |
| D036 | D036 | D036 | D036 | D036 |
| D037 | D037 | D037 | D037 | D037 |
| D038 | D038 | D038 | D038 | D038 |
| D039 | D039 | D039 | D039 | D039 |
| D040 | D040 | D040 | D040 | D040 |
| D041 | D041 | D041 | D041 | D041 |
| D042 | D042 | D042 | D042 | D042 |
| D043 | D043 | D043 | D043 | D043 |
| F001 | F001 | F001 | F001 | F001 |
| F002 | F002 | F002 | F002 | F002 |
| F003 | F003 | F003 | F003 | F003 |
| F004 | F004 | F004 | F004 | F004 |
| F005 | F005 | F005 | F005 | F005 |
| F006 | F006 | F006 | F006 | F006 |
| F007 | F007 | F007 | F007 | F007 |
| F008 | F008 | F008 | F008 | F008 |
| F009 | F009 | F009 | F009 | F009 |
| F010 | F010 | F010 | F010 | F010 |
| F011 | F011 | F011 | F011 | F011 |
| F012 | F012 | F012 | F012 | F012 |
| F019 | F019 | F019 | F019 | F019 |
| F020 | F020 | F020* | F020* | F020* |
| F021 | F021 | F021* | F021* | F021* |
| F022 | F022 | F022* | F022* | F022* |
| F023 | F023 | F023* | F023* | F023* |
| F024 | F024 | F024 | F024 | F024 |
| F025 | F025 | F025 | F025 | F025* |
| F026 | F026 | F026* | F026* | F026* |
| F027 | F027 | F027* | F027* | F027* |
| F028 | F028 | F028* | F028* | F028* |
| F032 | F032 | F032 | F032 | F032 |
| F034 | F034 | F034 | F034 | F034 |
| F035 | F035 | F035 | F035 | F035 |
| F037 | F037 | F037 | F037 | F037 |
| F038 | F038 | F038 | F038 | F038 |
| F039 | F039 | F039 | F039 | F039 |
| | F999 | F999 | F999 | F999 |
| K001 | K001 | K001 | K001 | K001 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|------------------------|---|---|---|---|
| K002 | K002 | K002 | K002 | K002 |
| K003 | K003 | K003 | K003 | K003 |
| K004 | K004 | K004 | K004 | K004 |
| K005 | K005 | K005 | K005 | K005 |
| K006 | K006 | K006 | K006 | K006 |
| K007 | K007 | K007 | K007 | K007 |
| K008 | K008 | K008 | K008 | K008 |
| K009 | K009 | K009 | K009 | K009 |
| K010 | K010 | K010 | K010 | K010 |
| K011 | K011 | K011 | K011 | K011 |
| K013 | K013 | K013 | K013 | K013 |
| K014 | K014 | K014 | K014 | K014 |
| K015 | K015 | K015 | K015 | K015 |
| K016 | K016 | K016 | K016 | K016 |
| K017 | K017 | K017 | K017 | K017 |
| K018 | K018 | K018 | K018 | K018 |
| K019 | K019 | K019 | K019 | K019 |
| K020 | K020 | K020 | K020 | K020 |
| K021 | K021 | K021 | K021 | K021 |
| K022 | K022 | K022 | K022 | K022 |
| K023 | K023 | K023 | K023 | K023 |
| K024 | K024 | K024 | K024 | K024 |
| K025 | K025 | K025 | K025 | K025 |
| K026 | K026 | K026 | K026 | K026 |
| K027 | K027 | K027 | K027 | K027 |
| K028 | K028 | K028 | K028 | K028 |
| K029 | K029 | K029 | K029 | K029 |
| K030 | K030 | K030 | K030 | K030 |
| K031 | K031 | K031 | K031 | K031 |
| K032 | K032 | K032 | K032 | K032 |
| K033 | K033 | K033 | K033 | K033 |
| K034 | K034 | K034 | K034 | K034 |
| K035 | K035 | K035 | K035 | K035 |
| K036 | K036 | K036 | K036 | K036 |
| K037 | K037 | K037 | K037 | K037 |
| K038 | K038 | K038 | K038 | K038 |
| K039 | K039 | K039 | K039 | K039 |
| K040 | K040 | K040 | K040 | K040 |
| K041 | K041 | K041 | K041 | K041 |
| K042 | K042 | K042 | K042 | K042 |
| K043 | K043 | K043 | K043 | K043 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|------------------------|---|---|---|---|
| K044 | K044 | K044 | K044 | K044 |
| K045 | K045 | K045 | K045 | K045 |
| K046 | K046 | K046 | K046 | K046 |
| K047 | K047 | K047 | K047 | K047 |
| K048 | K048 | K048 | K048 | K048 |
| K049 | K049 | K049 | K049 | K049 |
| K050 | K050 | K050 | K050 | K050 |
| K051 | K051 | K051 | K051 | K051 |
| K052 | K052 | K052 | K052 | K052 |
| K060 | K060 | K060 | K060 | K060 |
| K061 | K061 | K061 | K061 | K061 |
| K062 | K062 | K062 | K062 | K062 |
| K069 | K069 | K069 | K069 | K069 |
| K071 | K071 | K071 | K071 | K071 |
| K073 | K073 | K073 | K073 | K073 |
| K083 | K083 | K083 | K083 | K083 |
| K084 | K084 | K084 | K084 | K084 |
| K085 | K085 | K085 | K085 | K085 |
| K086 | K086 | K086 | K086 | K086 |
| K087 | K087 | K087 | K087 | K087 |
| K088 | K088 | K088 | K088 | K088 |
| K093 | K093 | K093 | K093 | K093 |
| K094 | K094 | K094 | K094 | K094 |
| K095 | K095 | K095 | K095 | K095 |
| K096 | K096 | K096 | K096 | K096 |
| K097 | K097 | K097 | K097 | K097 |
| K098 | K098 | K098 | K098 | K098 |
| K099 | K099 | K099 | K099 | K099 |
| K100 | K100 | K100 | K100 | K100 |
| K101 | K101 | K101 | K101 | K101 |
| K102 | K102 | K102 | K102 | K102 |
| K103 | K103 | K103 | K103 | K103 |
| K104 | K104 | K104 | K104 | K104 |
| K105 | K105 | K105 | K105 | K105 |
| K106 | K106 | K106 | K106 | K106 |
| K107 | K107 | K107 | K107 | K107 |
| K108 | K108 | K108 | K108 | K108 |
| K109 | K109 | K109 | K109 | K109 |
| K110 | K110 | K110 | K110 | K110 |
| K111 | K111 | K111 | K111 | K111 |
| K112 | K112 | K112 | K112 | K112 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|---------------------|---|---|---|---|
| K113 | K113 | K113 | K113 | K113 |
| K114 | K114 | K114 | K114 | K114 |
| K115 | K115 | K115 | K115 | K115 |
| K116 | K116 | K116 | K116 | K116 |
| K117 | K117 | K117 | K117 | K117 |
| K118 | K118 | K118 | K118 | K118 |
| K123 | K123 | K123 | K123 | K123 |
| K124 | K124 | K124 | K124 | K124 |
| K125 | K125 | K125 | K125 | K125 |
| K126 | K126 | K126 | K126 | K126 |
| K131 | K131 | K131 | K131 | K131 |
| K132 | K132 | K132 | K132 | K132 |
| K136 | K136 | K136 | K136 | K136 |
| K140 | K140 | K140 | K140 | K140 |
| K141 | K141 | K141 | K141 | K141 |
| K142 | K142 | K142 | K142 | K142 |
| K143 | K143 | K143 | K143 | K143 |
| K144 | K144 | K144 | K144 | K144 |
| K145 | K145 | K145 | K145 | K145 |
| K147 | K147 | K147 | K147 | K147 |
| K148 | K148 | K148 | K148 | K148 |
| K149 | K149 | K149 | K149 | K149 |
| K150 | K150 | K150 | K150 | K150 |
| K151 | K151 | K151 | K151 | K151 |
| K156 | K156 | K156 | K156 | K156 |
| K157 | K157 | K157 | K157 | K157 |
| K158 | K158 | K158 | K158 | K158 |
| K159 | K159 | K159 | K159 | K159 |
| K161 | K161 | K161 | K161 | K161 |
| K169 | K169 | K169 | K169 | K169 |
| K170 | K170 | K170 | K170 | K170 |
| K171 | K171 | K171 | K171 | K171 |
| K172 | K172 | K172 | K172 | K172 |
| P001 | P001 | P001 | P001 | P001 |
| P002 | P002 | P002 | P002 | P002 |
| P003 | P003 | P003 | P003 | P003 |
| P004 | P004 | P004 | P004 | P004 |
| P005 | P005 | P005 | P005 | P005 |
| P006 | P006 | P006 | P006 | P006 |
| P007 | P007 | P007 | P007 | P007 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|------------------------|---|---|---|---|
| P008 | P008 | P008 | P008 | P008 |
| P009 | P009 | P009 | P009 | P009 |
| P010 | P010 | P010 | P010 | P010 |
| P011 | P011 | P011 | P011 | P011 |
| P012 | P012 | P012 | P012 | P012 |
| P013 | P013 | P013 | P013 | P013 |
| P014 | P014 | P014 | P014 | P014 |
| P015 | P015 | P015 | P015 | P015 |
| P016 | P016 | P016 | P016 | P016 |
| P017 | P017 | P017 | P017 | P017 |
| P018 | P018 | P018 | P018 | P018 |
| P020 | P020 | P020 | P020 | P020 |
| P021 | P021 | P021 | P021 | P021 |
| P022 | P022 | P022 | P022 | P022 |
| P023 | P023 | P023 | P023 | P023 |
| P024 | P024 | P024 | P024 | P024 |
| P026 | P026 | P026 | P026 | P026 |
| P027 | P027 | P027 | P027 | P027 |
| P028 | P028 | P028 | P028 | P028 |
| P029 | P029 | P029 | P029 | P029 |
| P030 | P030 | P030 | P030 | P030 |
| P031 | P031 | P031 | P031 | P031 |
| P033 | P033 | P033 | P033 | P033 |
| P034 | P034 | P034 | P034 | P034 |
| P036 | P036 | P036 | P036 | P036 |
| P037 | P037 | P037 | P037 | P037 |
| P038 | P038 | P038 | P038 | P038 |
| P039 | P039 | P039 | P039 | P039 |
| P040 | P040 | P040 | P040 | P040 |
| P041 | P041 | P041 | P041 | P041 |
| P042 | P042 | P042 | P042 | P042 |
| P043 | P043 | P043 | P043 | P043 |
| P044 | P044 | P044 | P044 | P044 |
| P045 | P045 | P045 | P045 | P045 |
| P046 | P046 | P046 | P046 | P046 |
| P047 | P047 | P047 | P047 | P047 |
| P048 | P048 | P048 | P048 | P048 |
| P049 | P049 | P049 | P049 | P049 |
| P050 | P050 | P050 | P050 | P050 |
| P051 | P051 | P051 | P051 | P051 |
| P054 | P054 | P054 | P054 | P054 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|------------------------|---|---|---|---|
| P056 | P056 | P056 | P056 | P056 |
| P057 | P057 | P057 | P057 | P057 |
| P058 | P058 | P058 | P058 | P058 |
| P059 | P059 | P059 | P059 | P059 |
| P060 | P060 | P060 | P060 | P060 |
| P062 | P062 | P062 | P062 | P062 |
| P063 | P063 | P063 | P063 | P063 |
| P064 | P064 | P064 | P064 | P064 |
| P065 | P065 | P065 | P065 | P065 |
| P066 | P066 | P066 | P066 | P066 |
| P067 | P067 | P067 | P067 | P067 |
| P068 | P068 | P068 | P068 | P068 |
| P069 | P069 | P069 | P069 | P069 |
| P070 | P070 | P070 | P070 | P070 |
| P071 | P071 | P071 | P071 | P071 |
| P072 | P072 | P072 | P072 | P072 |
| P073 | P073 | P073 | P073 | P073 |
| P074 | P074 | P074 | P074 | P074 |
| P075 | P075 | P075 | P075 | P075 |
| P076 | P076 | P076 | P076 | P076 |
| P077 | P077 | P077 | P077 | P077 |
| P078 | P078 | P078 | P078 | P078 |
| P081 | P081 | P081 | P081 | P081 |
| P082 | P082 | P082 | P082 | P082 |
| P084 | P084 | P084 | P084 | P084 |
| P085 | P085 | P085 | P085 | P085 |
| P087 | P087 | P087 | P087 | P087 |
| P088 | P088 | P088 | P088 | P088 |
| P089 | P089 | P089 | P089 | P089 |
| P092 | P092 | P092 | P092 | P092 |
| P093 | P093 | P093 | P093 | P093 |
| P094 | P094 | P094 | P094 | P094 |
| P095 | P095 | P095 | P095 | P095 |
| P096 | P096 | P096 | P096 | P096 |
| P097 | P097 | P097 | P097 | P097 |
| P098 | P098 | P098 | P098 | P098 |
| P099 | P099 | P099 | P099 | P099 |
| P101 | P101 | P101 | P101 | P101 |
| P102 | P102 | P102 | P102 | P102 |
| P103 | P103 | P103 | P103 | P103 |
| P104 | P104 | P104 | P104 | P104 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|---------------------|--|--|--|--|
| P105 | P105 | P105 | P105 | P105 |
| P106 | P106 | P106 | P106 | P106 |
| P108 | P108 | P108 | P108 | P108 |
| P109 | P109 | P109 | P109 | P109 |
| P110 | P110 | P110 | P110 | P110 |
| P111 | P111 | P111 | P111 | P111 |
| P112 | P112 | P112 | P112 | P112 |
| P113 | P113 | P113 | P113 | P113 |
| P114 | P114 | P114 | P114 | P114 |
| P115 | P115 | P115 | P115 | P115 |
| P116 | P116 | P116 | P116 | P116 |
| P118 | P118 | P118 | P118 | P118 |
| P119 | P119 | P119 | P119 | P119 |
| P120 | P120 | P120 | P120 | P120 |
| P121 | P121 | P121 | P121 | P121 |
| P122 | P122 | P122 | P122 | P122 |
| P123 | P123 | P123 | P123 | P123 |
| P127 | P127 | P127 | P127 | P127 |
| P128 | P128 | P128 | P128 | P128 |
| P185 | P185 | P185 | P185 | P185 |
| P188 | P188 | P188 | P188 | P188 |
| P189 | P189 | P189 | P189 | P189 |
| P190 | P190 | P190 | P190 | P190 |
| P191 | P191 | P191 | P191 | P191 |
| P192 | P192 | P192 | P192 | P192 |
| P194 | P194 | P194 | P194 | P194 |
| P196 | P196 | P196 | P196 | P196 |
| P197 | P197 | P197 | P197 | P197 |
| P198 | P198 | P198 | P198 | P198 |
| P199 | P199 | P199 | P199 | P199 |
| P201 | P201 | P201 | P201 | P201 |
| P202 | P202 | P202 | P202 | P202 |
| P203 | P203 | P203 | P203 | P203 |
| P204 | P204 | P204 | P204 | P204 |
| P205 | P205 | P205 | P205 | P205 |
| PCBs | P999 w/F999 PCBs ¹ | P999 w/F999 PCBs ¹ | P999 w/F999 PCBs ¹ | P999 w/F999 PCBs ¹ |

¹ PCBs may only be stored in approved locations for container, specific approved tanks (stabilization or leachate), and may only be disposed in approved land disposal units.

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|------------------------|---|---|---|---|
| U001 | U001 | U001 | U001 | U001 |
| U002 | U002 | U002 | U002 | U002 |
| U003 | U003 | U003 | U003 | U003 |
| U004 | U004 | U004 | U004 | U004 |
| U005 | U005 | U005 | U005 | U005 |
| U006 | U006 | U006 | U006 | U006 |
| U007 | U007 | U007 | U007 | U007 |
| U008 | U008 | U008 | U008 | U008 |
| U009 | U009 | U009 | U009 | U009 |
| U010 | U010 | U010 | U010 | U010 |
| U011 | U011 | U011 | U011 | U011 |
| U012 | U012 | U012 | U012 | U012 |
| U014 | U014 | U014 | U014 | U014 |
| U015 | U015 | U015 | U015 | U015 |
| U016 | U016 | U016 | U016 | U016 |
| U017 | U017 | U017 | U017 | U017 |
| U018 | U018 | U018 | U018 | U018 |
| U019 | U019 | U019 | U019 | U019 |
| U020 | U020 | U020 | U020 | U020 |
| U021 | U021 | U021 | U021 | U021 |
| U022 | U022 | U022 | U022 | U022 |
| U023 | U023 | U023 | U023 | U023 |
| U024 | U024 | U024 | U024 | U024 |
| U025 | U025 | U025 | U025 | U025 |
| U026 | U026 | U026 | U026 | U026 |
| U027 | U027 | U027 | U027 | U027 |
| U028 | U028 | U028 | U028 | U028 |
| U029 | U029 | U029 | U029 | U029 |
| U030 | U030 | U030 | U030 | U030 |
| U031 | U031 | U031 | U031 | U031 |
| U032 | U032 | U032 | U032 | U032 |
| U033 | U033 | U033 | U033 | U033 |
| U034 | U034 | U034 | U034 | U034 |
| U035 | U035 | U035 | U035 | U035 |
| U036 | U036 | U036 | U036 | U036 |
| U037 | U037 | U037 | U037 | U037 |
| U038 | U038 | U038 | U038 | U038 |
| U039 | U039 | U039 | U039 | U039 |
| U041 | U041 | U041 | U041 | U041 |
| U042 | U042 | U042 | U042 | U042 |
| U043 | U043 | U043 | U043 | U043 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|------------------------|---|---|---|---|
| U044 | U044 | U044 | U044 | U044 |
| U045 | U045 | U045 | U045 | U045 |
| U046 | U046 | U046 | U046 | U046 |
| U047 | U047 | U047 | U047 | U047 |
| U048 | U048 | U048 | U048 | U048 |
| U049 | U049 | U049 | U049 | U049 |
| U050 | U050 | U050 | U050 | U050 |
| U051 | U051 | U051 | U051 | U051 |
| U052 | U052 | U052 | U052 | U052 |
| U053 | U053 | U053 | U053 | U053 |
| U055 | U055 | U055 | U055 | U055 |
| U056 | U056 | U056 | U056 | U056 |
| U057 | U057 | U057 | U057 | U057 |
| U058 | U058 | U058 | U058 | U058 |
| U059 | U059 | U059 | U059 | U059 |
| U060 | U060 | U060 | U060 | U060 |
| U061 | U061 | U061 | U061 | U061 |
| U062 | U062 | U062 | U062 | U062 |
| U063 | U063 | U063 | U063 | U063 |
| U064 | U064 | U064 | U064 | U064 |
| U066 | U066 | U066 | U066 | U066 |
| U067 | U067 | U067 | U067 | U067 |
| U068 | U068 | U068 | U068 | U068 |
| U069 | U069 | U069 | U069 | U069 |
| U070 | U070 | U070 | U070 | U070 |
| U071 | U071 | U071 | U071 | U071 |
| U072 | U072 | U072 | U072 | U072 |
| U073 | U073 | U073 | U073 | U073 |
| U074 | U074 | U074 | U074 | U074 |
| U075 | U075 | U075 | U075 | U075 |
| U076 | U076 | U076 | U076 | U076 |
| U077 | U077 | U077 | U077 | U077 |
| U078 | U078 | U078 | U078 | U078 |
| U079 | U079 | U079 | U079 | U079 |
| U080 | U080 | U080 | U080 | U080 |
| U081 | U081 | U081 | U081 | U081 |
| U082 | U082 | U082 | U082 | U082 |
| U083 | U083 | U083 | U083 | U083 |
| U084 | U084 | U084 | U084 | U084 |
| U085 | U085 | U085 | U085 | U085 |
| U086 | U086 | U086 | U086 | U086 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|---------------------|---|---|---|---|
| U087 | U087 | U087 | U087 | U087 |
| U088 | U088 | U088 | U088 | U088 |
| U089 | U089 | U089 | U089 | U089 |
| U090 | U090 | U090 | U090 | U090 |
| U091 | U091 | U091 | U091 | U091 |
| U092 | U092 | U092 | U092 | U092 |
| U093 | U093 | U093 | U093 | U093 |
| U094 | U094 | U094 | U094 | U094 |
| U095 | U095 | U095 | U095 | U095 |
| U096 | U096 | U096 | U096 | U096 |
| U097 | U097 | U097 | U097 | U097 |
| U098 | U098 | U098 | U098 | U098 |
| U099 | U099 | U099 | U099 | U099 |
| U101 | U101 | U101 | U101 | U101 |
| U102 | U102 | U102 | U102 | U102 |
| U103 | U103 | U103 | U103 | U103 |
| U105 | U105 | U105 | U105 | U105 |
| U106 | U106 | U106 | U106 | U106 |
| U107 | U107 | U107 | U107 | U107 |
| U108 | U108 | U108 | U108 | U108 |
| U109 | U109 | U109 | U109 | U109 |
| U110 | U110 | U110 | U110 | U110 |
| U111 | U111 | U111 | U111 | U111 |
| U112 | U112 | U112 | U112 | U112 |
| U113 | U113 | U113 | U113 | U113 |
| U114 | U114 | U114 | U114 | U114 |
| U115 | U115 | U115 | U115 | U115 |
| U116 | U116 | U116 | U116 | U116 |
| U117 | U117 | U117 | U117 | U117 |
| U118 | U118 | U118 | U118 | U118 |
| U119 | U119 | U119 | U119 | U119 |
| U120 | U120 | U120 | U120 | U120 |
| U121 | U121 | U121 | U121 | U121 |
| U122 | U122 | U122 | U122 | U122 |
| U123 | U123 | U123 | U123 | U123 |
| U124 | U124 | U124 | U124 | U124 |
| U125 | U125 | U125 | U125 | U125 |
| U126 | U126 | U126 | U126 | U126 |
| U127 | U127 | U127 | U127 | U127 |
| U128 | U128 | U128 | U128 | U128 |
| U129 | U129 | U129 | U129 | U129 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|------------------------|---|---|---|---|
| U130 | U130 | U130 | U130 | U130 |
| U131 | U131 | U131 | U131 | U131 |
| U132 | U132 | U132 | U132 | U132 |
| U133 | U133 | U133 | U133 | U133 |
| U134 | U134 | U134 | U134 | U134 |
| U135 | U135 | U135 | U135 | U135 |
| U136 | U136 | U136 | U136 | U136 |
| U137 | U137 | U137 | U137 | U137 |
| U138 | U138 | U138 | U138 | U138 |
| U140 | U140 | U140 | U140 | U140 |
| U141 | U141 | U141 | U141 | U141 |
| U142 | U142 | U142 | U142 | U142 |
| U143 | U143 | U143 | U143 | U143 |
| U144 | U144 | U144 | U144 | U144 |
| U145 | U145 | U145 | U145 | U145 |
| U146 | U146 | U146 | U146 | U146 |
| U147 | U147 | U147 | U147 | U147 |
| U148 | U148 | U148 | U148 | U148 |
| U149 | U149 | U149 | U149 | U149 |
| U150 | U150 | U150 | U150 | U150 |
| U151 | U151 | U151 | U151 | U151 |
| U152 | U152 | U152 | U152 | U152 |
| U153 | U153 | U153 | U153 | U153 |
| U154 | U154 | U154 | U154 | U154 |
| U155 | U155 | U155 | U155 | U155 |
| U156 | U156 | U156 | U156 | U156 |
| U157 | U157 | U157 | U157 | U157 |
| U158 | U158 | U158 | U158 | U158 |
| U159 | U159 | U159 | U159 | U159 |
| U160 | U160 | U160 | U160 | U160 |
| U161 | U161 | U161 | U161 | U161 |
| U162 | U162 | U162 | U162 | U162 |
| U163 | U163 | U163 | U163 | U163 |
| U164 | U164 | U164 | U164 | U164 |
| U165 | U165 | U165 | U165 | U165 |
| U166 | U166 | U166 | U166 | U166 |
| U167 | U167 | U167 | U167 | U167 |
| U168 | U168 | U168 | U168 | U168 |
| U169 | U169 | U169 | U169 | U169 |
| U170 | U170 | U170 | U170 | U170 |
| U171 | U171 | U171 | U171 | U171 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|------------------------|---|---|---|---|
| U172 | U172 | U172 | U172 | U172 |
| U173 | U173 | U173 | U173 | U173 |
| U174 | U174 | U174 | U174 | U174 |
| U176 | U176 | U176 | U176 | U176 |
| U177 | U177 | U177 | U177 | U177 |
| U178 | U178 | U178 | U178 | U178 |
| U179 | U179 | U179 | U179 | U179 |
| U180 | U180 | U180 | U180 | U180 |
| U181 | U181 | U181 | U181 | U181 |
| U182 | U182 | U182 | U182 | U182 |
| U183 | U183 | U183 | U183 | U183 |
| U184 | U184 | U184 | U184 | U184 |
| U185 | U185 | U185 | U185 | U185 |
| U186 | U186 | U186 | U186 | U186 |
| U187 | U187 | U187 | U187 | U187 |
| U188 | U188 | U188 | U188 | U188 |
| U189 | U189 | U189 | U189 | U189 |
| U190 | U190 | U190 | U190 | U190 |
| U191 | U191 | U191 | U191 | U191 |
| U192 | U192 | U192 | U192 | U192 |
| U193 | U193 | U193 | U193 | U193 |
| U194 | U194 | U194 | U194 | U194 |
| U196 | U196 | U196 | U196 | U196 |
| U197 | U197 | U197 | U197 | U197 |
| U200 | U200 | U200 | U200 | U200 |
| U201 | U201 | U201 | U201 | U201 |
| U202 | U202 | U202 | U202 | U202 |
| U203 | U203 | U203 | U203 | U203 |
| U204 | U204 | U204 | U204 | U204 |
| U205 | U205 | U205 | U205 | U205 |
| U206 | U206 | U206 | U206 | U206 |
| U207 | U207 | U207 | U207 | U207 |
| U208 | U208 | U208 | U208 | U208 |
| U209 | U209 | U209 | U209 | U209 |
| U210 | U210 | U210 | U210 | U210 |
| U211 | U211 | U211 | U211 | U211 |
| U213 | U213 | U213 | U213 | U213 |
| U214 | U214 | U214 | U214 | U214 |
| U215 | U215 | U215 | U215 | U215 |
| U216 | U216 | U216 | U216 | U216 |
| U217 | U217 | U217 | U217 | U217 |

| EPA Waste Code List | Module III (Containers) May store these wastes | Module IV (Tanks) May store these wastes | Module IV (Tanks) May treat these wastes | Module VI (Landfills) May dispose these wastes |
|---------------------|---|---|---|---|
| U218 | U218 | U218 | U218 | U218 |
| U219 | U219 | U219 | U219 | U219 |
| U220 | U220 | U220 | U220 | U220 |
| U221 | U221 | U221 | U221 | U221 |
| U222 | U222 | U222 | U222 | U222 |
| U223 | U223 | U223 | U223 | U223 |
| U225 | U225 | U225 | U225 | U225 |
| U226 | U226 | U226 | U226 | U226 |
| U227 | U227 | U227 | U227 | U227 |
| U228 | U228 | U228 | U228 | U228 |
| U234 | U234 | U234 | U234 | U234 |
| U235 | U235 | U235 | U235 | U235 |
| U236 | U236 | U236 | U236 | U236 |
| U237 | U237 | U237 | U237 | U237 |
| U238 | U238 | U238 | U238 | U238 |
| U239 | U239 | U239 | U239 | U239 |
| U240 | U240 | U240 | U240 | U240 |
| U243 | U243 | U243 | U243 | U243 |
| U244 | U244 | U244 | U244 | U244 |
| U246 | U246 | U246 | U246 | U246 |
| U247 | U247 | U247 | U247 | U247 |
| U248 | U248 | U248 | U248 | U248 |
| U249 | U249 | U249 | U249 | U249 |
| U271 | U271 | U271 | U271 | U271 |
| U278 | U278 | U278 | U278 | U278 |
| U279 | U279 | U279 | U279 | U279 |
| U280 | U280 | U280 | U280 | U280 |
| U328 | U328 | U328 | U328 | U328 |
| U353 | U353 | U353 | U353 | U353 |
| U359 | U359 | U359 | U359 | U359 |
| U364 | U364 | U364 | U364 | U364 |
| U367 | U367 | U367 | U367 | U367 |
| U372 | U372 | U372 | U372 | U372 |
| U373 | U373 | U373 | U373 | U373 |
| U387 | U387 | U387 | U387 | U387 |
| U389 | U389 | U389 | U389 | U389 |
| U394 | U394 | U394 | U394 | U394 |
| U395 | U395 | U395 | U395 | U395 |
| U404 | U404 | U404 | U404 | U404 |
| U408 | U408 | U408 | U408 | U408 |
| U409 | U409 | U409 | U409 | U409 |

| EPA Waste Code List | Module III (Containers) | Module IV (Tanks) | Module IV (Tanks) | Module VI (Landfills) |
|---------------------|---|---|---|---|
| U410 U411 | May store these wastes U410 U411 | May store these wastes U410 U411 | May treat these wastes U410 U411 | May dispose these wastes U410 U411 |

NOTES

1. "EPA LIST" (Column 1) are all EPA Waste Codes found in 40 CFR Part 261.
2. Must meet Condition II.D.7. of this permit and other conditions of this WAP for storage of waste and the waste must be compatible with storage vessel materials of construction.
3. Must meet LDR Standards (40 CFR 268) or Approved Variances.
4. The volatile organics in the waste must be < 500 ppm per subpart CC method or GMF/Generator knowledge.
5. For the dioxin wastes marked with an "**", refer to the Supplemental Waste Management Plan, Attachment II-8, and Condition II.D.7.

Appendix 4

Halogenated Organic Compounds of Concern

| ANALYTE | CAS Number | Analysis Method |
|---|------------|-----------------------|
| VOLATILE ORGANICS | | |
| Bromodichloromethane | 75-27-4 | SW-846 8260B |
| Bromoform (Tribromomethane) | 75-25-2 | SW-846 8260B |
| Bromomethane | 74-83-9 | SW-846 8260B |
| Carbon tetrachloride | 56-23-5 | SW-846 8260B |
| Chlorobenzene | 108-90-7 | SW-846 8260B |
| 2-Chloro-1,3-butadiene (Chloroprene) | 126-99-8 | SW-846 8260B |
| Chloroethane | 75-00-3 | SW-846 8260B |
| 2-chloroethyl vinyl ether | 110-75-3 | SW-846 8260B |
| Chloroform | 67-66-3 | SW-846 8260B |
| Chloromethane | 74-87-3 | SW-846 8260B |
| 3-Chloropropene (Allyl Chloride) | 107-05-1 | SW-846 8260B |
| Dibromochloromethane | 124-48-1 | SW-846 8260B |
| 1,2-Dibromo-3-chloropropane | 96-12-8 | SW-846 8260B or 8270C |
| 1,2-Dibromoethane | 106-93-4 | SW-846 8260B |
| Dibromomethane (methylene bromide) | 74-95-3 | SW-846 8260B |
| trans-1,4-Dichloro-2-butene | 110-57-6 | SW-846 8260B |
| Dichlorodifluoromethane | 75-71-8 | SW-846 8260B |
| 1,1-Dichloroethane | 75-34-3 | SW-846 8260B |
| 1,2-Dichloroethane | 107-06-2 | SW-846 8260B |
| trans-1,2-Dichloroethene | 156-60-5 | SW-846 8260B |
| 1,1-Dichloroethene | 75-35-4 | SW-846 8260B |
| 1,2-Dichloropropane | 78-87-5 | SW-846 8260B |
| cis-1,3-Dichloropropene | 10061-01-5 | SW-846 8260B |
| trans-1,3-Dichloropropene | 10061-02-6 | SW-846 8260B |
| Methyl iodide (Iodomethane) | 74-88-4 | SW-846 8260B |
| Methylene chloride (Dichloromethane) | 75-09-2 | SW-846 8260B |
| Pentachloroethane | 76-01-7 | SW-846 8260B or 8270C |
| 1,1,1,2-Tetrachloroethane | 630-20-6 | SW-846 8260B |
| 1,1,2,2-Tetrachloroethane | 79-34-5 | SW-846 8260B |

| ANALYTE | CAS Number | Analysis Method |
|--|-------------------|------------------------|
| Tetrachloroethene | 127-18-4 | SW-846 8260B |
| 1,1,1-Trichloroethane | 71-55-6 | SW-846 8260B |
| 1,1,2-Trichloroethane | 79-00-5 | SW-846 8260B |
| Trichloroethene | 79-01-6 | SW-846 8260B |
| Trichlorofluoromethane | 75-69-4 | SW-846 8260B |
| 1,2,3-Trichloropropane | 96-18-4 | SW-846 8260B |
| Vinyl chloride | 75-01-4 | SW-846 8260B |
| SEMIVOLATILE COMPOUNDS (ACID/BASE/NEUTRAL EXTRACTABLES) | | |
| bis(2-Chloroethoxy)methane | 111-91-1 | SW-846 8270C |
| bis(2-Chloroethyl) ether | 111-44-4 | SW-846 8270C |
| bis(2-Chloroisopropyl) ether (2,2'-oxybis(1-Chloropropane)) | 108-60-1 | SW-846 8270C |
| p-Chloroaniline | 106-47-8 | SW-846 8270C |
| Chlorobenzilate | 510-15-6 | SW-846 8270C |
| 4-Chloro-3-methylphenol (p-Chloro-m-cresol) | 59-50-7 | SW-846 8270C |
| 2-Chloronaphthalene | 91-58-7 | SW-846 8270C |
| 2-Chlorophenol | 95-57-8 | SW-846 8270C |
| 3-Chloropropionitrile | | |
| 1,2-Dichlorobenzene (o-Dichlorobenzene) | 95-50-1 | SW-846 8270C |
| 1,3-Dichlorobenzene (m-Dichlorobenzene) | 541-73-1 | SW-846 8270C |
| 1,4-Dichlorobenzene (p-Dichlorobenzene) | 106-46-7 | SW-846 8270C |
| 3,3'-Dichlorobenzidine | 91-94-1 | SW-846 8270C |
| 2,4-Dichlorophenol | 120-83-2 | SW-846 8270C |
| 2,6-Dichlorophenol | 87-65-0 | SW-846 8270C |
| Hexachlorobenzene | 118-74-1 | SW-846 8270C |
| Hexachlorobutadiene | 87-68-3 | SW-846 8270C |
| Hexachlorocyclopentadiene | 77-47-4 | SW-846 8270C |
| Hexachloroethane | 67-72-1 | SW-846 8270C |
| Hexachlorophene | 70-30-4 | SW-846 8270C |
| Hexachloropropene | 1888-71-7 | SW-846 8270C |
| 4,4-Methylinebis(2-chloroaniline) | | |
| Isodrin | 465-73-6 | SW-846 8270C |

| ANALYTE | CAS Number | Analysis Method |
|----------------------------|-------------------|------------------------|
| Pentachlorobenzene | 608-93-5 | SW-846 8270C |
| Pentachloronitrobenzene | 82-68-8 | SW-846 8270C |
| Pentachlorophenol | 87-86-5 | SW-846 8270C |
| Pronamide | 23950-58-5 | SW-846 8270C |
| 1,2,4,5-Tetrachlorobenzene | 95-94-3 | SW-846 8270C |
| 2,3,4,6-Tetrachlorophenol | 58-90-2 | SW-846 8270C |
| 1,2,4-Trichlorobenzene | 120-82-1 | SW-846 8270C |
| 2,4,5-Trichlorophenol | 95-95-4 | SW-846 8270C |
| 2,4,6-Trichlorophenol | 88-06-2 | SW-846 8270C |

Tris(2,3-dibromopropyl)phosphate

| ORGANOCHLORINE PESTICIDES & PCBs | | |
|---|------------|----------------------|
| Aldrin | 309-00-2 | SW-846 8081A or 8270 |
| Hexachlorocyclohexane alpha-BHC | 319-84-6 | SW-846 8081A or 8250 |
| Hexachlorocyclohexane beta-BHC | 319-85-7 | SW-846 8081A or 8250 |
| Hexachlorocyclohexane delta-BHC | 319-86-8 | SW-846 8081A or 8250 |
| Hexachlorocyclohexane gamma-BHC (Lindane) | 58-89-9 | SW-846 8081A or 8250 |
| Chlordane | 57-74-9 | SW-846 8081A or 8250 |
| 4,4'-DDD | 72-54-8 | SW-846 8081A or 8270 |
| 4,4'-DDE | 72-55-9 | SW-846 8081A or 8270 |
| 4,4'-DDT | 50-29-3 | SW-846 8081A or 8270 |
| Dieldrin | 60-57-1 | SW-846 8081A or 8270 |
| alpha-Endosulfan (Endosulfan I) | 959-98-8 | SW-846 8081A or 8270 |
| beta-Endosulfan (Endosulfan II) | 33213-65-9 | SW-846 8081A |
| Endrin | 72-20-8 | SW-846 8081A or 8270 |
| Endrin aldehyde | 7421-93-4 | SW-846 8081A or 8270 |
| Heptachlor | 76-44-8 | SW-846 8081A or 8270 |
| Heptachlor epoxide | 1024-57-3 | SW-846 8081A or 8270 |
| Kepone | 143-50-0 | SW-846 8270C |
| Methoxychlor | 72-43-5 | SW-846 8081A or 8270 |
| PCB-1016 | 12674-11-2 | SW-846 8082 |
| PCB-1221 | 11104-28-2 | SW-846 8082 |
| PCB-1232 | 11141-16-5 | SW-846 8082 |
| PCB-1242 | 53469-21-9 | SW-846 8082 |

| ANALYTE | CAS Number | Analysis Method |
|---|-------------------|------------------------|
| PCB-1248 | 12672-29-6 | SW-846 8082 |
| PCB-1254 | 11097-69-1 | SW-846 8082 |
| PCB-1260 | 11096-82-5 | SW-846 8082 |
| Toxaphene | 8001-35-2 | SW-846 8081A or 8250 |
| Phenoxyacetic acid herbicides * | | |
| 2,4-Dichlorophenoxy acetic acid (2,4-D) | 94-75-7 | SW-846 8151A |
| 2,4,5-T | 93-76-5 | SW-846 8151A |
| 2,4,5-TP (Silvex) | 93-72-1 | SW-846 8151A |

* When constituent specific analysis is conducted, these only have to be quantified if the waste stream is non-incinerator residue and contains one or more of these compounds and/or carries a K042 or K043 waste code.